

BULLETIN OF THE UNIVERSITY OF VERMONT

We, the faculty of the University of Vermont, in the spirit and tradition of free universities throughout the world, are agreed upon the following statement of principles on academic freedom and responsibility.

We believe that incorporation of these principles into the organization of the University of Vermont will re-emphasize the importance of academic freedom to the basic health of the University, and also serve as a statement of policy on the rights and responsibilities of faculty members at this institution. It has been our intent to state these principles in terms broad enough so that they may be valid not only in these critical times when academic freedom and personal liberty are in jeopardy both at home and abroad, but also in the future insofar as the future can be foreseen.

The Necessity of Academic Freedom in Higher Education. The main purpose of a university has always been, must always be, to stimulate the thinking and the creative powers of its students and its faculty. As an institution it deals in ideas, not only old and accepted ones but new ones that may be full of explosive power. If they are explosive they are bound to be disconcerting, even painful, to some on the campus and to many beyond its bor-

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ders. Inevitably they will be called dangerous by the timid and short-sighted, but to those who really believe in the fruitfulness of human thought, the real danger would appear only if the flow of such ideas should cease. For then indeed sterility would have taken over our campus. Our faculty would no longer deserve the name of intellectuals and our students, regardless of degrees attained, could no longer claim to be educated. They would leave our campus accustomed only to the commonplace, satisfied with the mediocre, ignorant or afraid of ideas which catch fire.

Academic freedom is therefore not solely a right or privilege of the faculty but is the fulfillment of the obligation on the part of the University to provide an atmosphere in which intellectual growth may take place.

Academic Freedom and Special Responsibilities of Faculty Members. We subscribe to the following statement on academic freedom and the responsibilities of faculty members adopted by the American Association of University Professors: "The teacher is entitled to full freedom in research and in the publication of the results, subject to the adequate performance of his other academic duties, but research for pecuniary return should be based upon an understanding with the administration of the institution.

"The teacher is entitled to freedom in the classroom in discussing his subject, but he should be careful not to introduce into his teaching contro-

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The University of Vermont fully supports and complies with Title VI of the Civil Rights Act of 1964 and does not discriminate in any way in any of its policies on the basis of race, color, or national origin.

THE CATALOGUE • 1971 - 1972
ANNOUNCEMENTS • 1972 - 1973

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Although its legal title is The University of Vermont and State Agricultural College, the University is known to its students and alumni as UVM. This popular abbreviation is derived from the Latin Universitas Viridis Montis.

Bulletin of the University of Vermont

VOLUME 9

MARCH 10, 1971

NUMBER 12

Published by the University of Vermont, 85 South Prospect Street, Burlington, Vermont 05401, 16 times a year: once in September, October, November, January, April, May and June; twice in August, December and February; and three times in March. Second Class postage paid at Burlington, Vermont 05401.

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 F. ALINE COFFEY, B.S. (1960) *Adjunct Assistant Professor of Home Economics*
 LAURENCE H. COFFIN, M.D. (Dec. 1969) *Associate Professor of Thoracic and Cardiac Surgery*
 JULIUS GEORGE COHEN, M.D. (1950) *Clinical Associate Professor of Psychiatry*
 JEAN AVERILL CONDON, M.A. (1967) *Specialist in Physical Education*
 ARTHUR JAMES CONDREN, Ph.D. (Mar. 1969) *Assistant Professor of Civil Engineering*
 ROBERT A. CONQUEST, Ph.D. (1970) *Adjunct Assistant Professor of Psychology*
 *DAVID R. CONRAD, Ph.D. (1970) *Assistant Professor of Education*
 *PHILIP WILLIAM COOK, Ph.D. (1963) *Associate Professor of Botany*
 *ROGER LEE COOKE, Ph.D. (1968) *Assistant Professor of Mathematics*
 *ROBERT WILLIAM COON, M.D. (1955) *Professor of Pathology*
 JAMES P. CORCORAN, M.A. (1970) *Instructor in Philosophy and Religion*
 DEAN C. CORRIGAN, Ed.D. (1969) *Professor of Education*
 LUCIEN M. COTE, B.S. (1969) *Adjunct Instructor in Medical Technology*
 *REX DEE COUCH, M.D. (1962; 1967) *Clinical Associate Professor of Pathology*
 WILTON WARNER COVEY, M.D. (1966) *Clinical Instructor in Psychiatry*
 *JOHN EDWARD CRAIGHEAD, M.D. (1968) *Professor of Pathology*
 ALBERT JAMES CRANDALL, M.D. (1939) *Clinical Instructor in Surgery*
 EDWARD BYINGTON CRANE, M.D. (Jan. 1961) *Clinical Instructor in Community Medicine*
 GRANT CRITCHFIELD, M.A. (1968) *Instructor in Romance Languages*
 MARY J. CRONIN, M.Sc. (1970) *Associate Professor of Nursing*
 MICHAEL W. CRONIN, M.A. (1970) *Instructor in Communication and Theatre*
 GEORGE CHAPMAN CROOKS, Ph.D. (1930) *Professor of Chemistry*
 JAMES M. CROSS, B.S. (1964) *Instructor in Physical Education*
 HAROLD D. CROSS, M.D. (1971) *Clinical Assistant Professor of Medicine*
 *ALBERT DARY CROWELL, Ph.D. (1955) *Professor of Physics*
 FREDERICK J. CURLIN, M.D. (1970) *Instructor in Psychiatry*
 NANCIA A. CURTIS, M.D. (1970) *Clinical Instructor in Psychiatry*
 FLORENCE MARY CZERNIAWSKI, M.T. (1967) *Instructor in Medical Technology*
 *MALCOLM DANIEL DAGGETT, Ph.D. (1945) *Professor of Romance Languages*
 ELIZABETH T. DAHL, B.Mus. (1960) *Instructor in Music*
 ELLIOT DANFORTH, JR., M.D. (1970) *Assistant Professor of Medicine*
 *ROBERT VINCENT DANIELS, Ph.D. (1956-57; 1958) *Professor of History*
 ELIZABETH DAVIS, B.S. (1972) *Adjunct Assistant Professor in Nursing*
 JOHN HERSHEL DAVIS, M.D. (Dec. 1968) *Professor of Surgery*
 PHILIP HOVEY DAVIS, M.D. (1958) *Clinical Associate Professor of Orthopedic Surgery*
 ROBERT EARLE DAVIS, M.D. (1968) *Clinical Assistant Professor of Obstetrics and Gynecology*
 *JEAN MARGARET DAVISON, Ph.D. (1955) *Professor of Classics*
 *JOHN AMERPOHL DAVISON, Ph.D. (1967) *Associate Professor of Zoology*
 WILLIAM EARL DAVISON, M.F.A. (Jan. 1966) *Assistant Professor of Art*
 ROBERT P. DAVISON, M.E. (1940) *Adjunct Professor, Extension*
 *ROBERT FRANK DAWSON, Ph.D. (1964-65; 1969) *Associate Professor of Civil Engineering*
 ROBERT STUART DEANE, M.B.Bch. (1967) *Associate Professor of Anesthesiology*
 WILLIAM NELSON DEANE, Ph.D. (1960) *Clinical Assistant Professor of Psychiatry*
 EDITH FAYE DECK, M.S. (1969) *Assistant Professor of Nursing and Sociology*
 JOYCE M. DELARICHELIERE, M.A. (1972) *Instructor in Romance Languages*
 *LUBOMIR A. D. DELLIN, J.S.D. (1957) *Professor of Economics and Political Science*
 ALINE LOUISE DEMERS, M.S. (1960) *Associate Professor of Nursing*
 W. LANDON DENNISON, JR., M.D. (1970) *Clinical Assistant Professor of Dermatology*
 GINO ALDO DENTE, M.D. (1950) *Associate Professor of Anesthesiology*

- *ROBERT WARREN DETENBECK, Ph.D. (1967) *Professor of Physics*
 ALBERT INSKIP DICKERSON, JR., Ph.D. (1966) *Assistant Professor of English*
 MARY JANE DICKERSON (MRS. A. I.) M.A. (1966) *Instructor in English*
 PETER A. DIETRICH, M.D. (1971) *Assistant Professor of Radiology*
 CLEASON S. DIETZEL, Ph.D. (1971) *Assistant Professor of Psychology*
 RAYMOND GEORGE DILLEY, M.A. (1965) *Instructor in Communication and Theatre*
- CARROLL W. DODGE, Ph.D. (1970) *Visiting Professor of Botany*
 RICHARD BOWDITCH DOES, Ph.D. (1969) *Assistant Professor of Psychology*
 RAYMOND MADIFORD PEARDON DONAGHY, M.D. (1946) *Professor of Neurosurgery*
 J. EDWARD DONNELLY, M.A. (1952) *Associate Professor of Physical Education*
 JOHN ROBERT DONNELLY, Ph.D. (1969) *Assistant Professor of Forestry*
 *GERALD ALTON DONOVAN, Ph.D. (Nov. 1960) *Professor of Animal Sciences*
 BARRY L. DOOLAN, Ph.D. (1970) *Assistant Professor of Geology*
 HELEN MARIE DOREMUS, D.V.M. (Jan. 1970) *Assistant Professor of Animal Pathology*
 HENRY MEADE DOREMUS, II, D.V.M. (1964) *Associate Professor of Pharmacology*
 Assistant Professor of Animal Pathology
- *THOMAS W. DOWE, Ph.D. (1957) *Professor of Animal Sciences*
 *RICHARD NEAL DOWNER, Ph.D. (1967) *Assistant Professor of Civil Engineering*
 *JOHN C. DRAKE, Ph.D. (1970) *Assistant Professor of Geology*
 BRUCE J. DUBOV, B.S. (1970) *Associate Professor of Military Science*
 *HOWARD DUCHACEK, M.S.A.E. (1949) *Associate Professor of Mechanical Engineering*
 DAVID RICHARD DUFFELL, M.D. (Dec. 1967) *Associate Professor of Pathology*
 *FRED WILLIAMS DUNIHUE, Ph.D. (1936) *Professor of Anatomy*
 THOMAS CALVIN DUNKLEY, M.Ed. (1966) *Assistant Professor of Physical Education*
 MICHAEL J. DUNN, M.D. (Mar. 1969) *Assistant Professor of Medicine*
 PETER B. DUNNE, M.D. (1971) *Associate Professor of Neurology*
 HERBERT ASHLEY DURFEE, JR., M.D. (1957) *Professor of Obstetrics and Gynecology*
 *ALEXANDER HARRY DUTHIE, Ph.D. (Feb. 1964) *Associate Professor of Animal Sciences*
 Associate Professor of Mathematics
- *JULIUS SOLOMON DWORC, Ph.D. (1954) *Associate Professor of Mathematics*
 SPENCER WRIGHT EARNSHAW, M.A. (1969) *Instructor in Mathematics*
 ROBERT WEBSTER EASTMAN, LL.B. (Feb. 1952) *Adjunct Assistant Professor of Political Science*
- DWIGHT K. EDDY, M.E.E. (1955) *Adjunct Associate Professor of Resource Economics*
 WINSTON MILO EDDY, M.D. (Oct. 1960) *Associate Professor of Medicine*
 MARGARET F. EDWARDS, M.A. (1971) *Assistant Professor of English*
 ANN I. EGNER, B.A. (1968) *Instructor in Education*
 PHILIP N. ELDRED, Ph.D. (Jan. 1970) *Assistant Professor of Civil Engineering*
 R. DAVID ELLERSON, M.D. (1970) *Clinical Instructor in Pediatrics*
 FRANK STONE EMANUEL, B.S. (Jan. 1968) *Instructor in Institutional Administration*
 SYLVIA JANE EMANUEL (MRS. F. S.) M.S. (1966) *Assistant Professor, Clothing and Textiles*
 FAITH GRISCOM EMERSON, M.A. (1959) *Associate Professor of Nursing*
 E. STANLEY EMERY, III, M.D. (1970) *Assistant Professor of Neurology*
 CLINTON A. ERB, Ph.D. (1971) *Assistant Professor of Education*
 ROBERT HODGSKIN ERDMANN, LL.B. (1967) *Instructor in Economics and Business Administration*
 PAUL ANDERSON ESCHHOLZ, Ph.D. (1969) *Assistant Professor of English*
 LOUIS WILLIAM ESPOSITO, M.D. (Feb. 1944; 1954) *Instructor in Urology*
 *WARREN O. ESSLER, Ph.D. (1961) *Professor of Electrical Engineering*
 *BUD ETHERTON, Ph.D. (1968) *Associate Professor of Botany*
 JOHN CLIFFORD EVANS, B.S. (1937) *Associate Professor of Physical Education*
 *FREDERICK CHRISTIAN EVERING, JR., Ph.D. (1965) *Associate Professor of Electrical Engineering*
 Associate Professor of Plant and Soil Science
- DEAN RICHARD EVERT, Ph.D. (1970) *Assistant Professor of Plant and Soil Science*
 *JON BAKER FACKLER, Ph.D. (1968) *Assistant Professor of History*
 WILLIAM THOMAS FAGAN, JR., M.D. (1954) *Associate Professor of Urology*
 DAVID SPERBER FAIGEL, D.D.S. (1954) *Associate Professor of Dental Hygiene*
 JAMES B. FALBY, B.S. (1971) *Instructor in Radiology*
 JOHN EDWARD FARNHAM, D.M.D. (1963) *Associate Professor of Dental Hygiene*
 Clinical Associate Professor of Surgery
- SANDRA MORTON FARRELL, M.S. (1962-66; 1968) *Specialist in Physical Education*
 DOUGLAS PATTEN FAY, M.S. (1953) *Associate Professor of Civil Engineering*

- EDWARD JOSEPH FEIDNER, M.F.A. (1958) *Associate Professor of Communication and Theatre*
- SAMUEL B. FEITELBERG, M.A. (1971) *Associate Professor of Rehabilitation Medicine*
- *JEREMY POLLARD FELT, Ph.D. (1957) *Professor of History*
- KAYE FELT, M.A. (1971) *Lecturer in the Experimental Program*
- CHRISTIE K. FENGLER, M.A. (1970) *Instructor in Art*
- *JAMES GATES FERGUSON, JR., Ph.D. (1969) *Assistant Professor of Psychology*
- *CHARLES LYNN FIFE, Ph.D. (Dec. 1966) *Assistant Professor of Resource Economics*
- JAN FINK, B.S. (1970) *Instructor in Nursing*
- GLORIA J. FINN, M.S. (1969) *Instructor in Anatomy*
- KENNETH N. FISHELL, Ed.D. (1971) *Professor of Education*
- LAURA F. FISHMAN, M.A. (1971) *Instructor in Sociology*
- JOHN RICHARD FITZGERALD, M.D. (1961) *Clinical Assistant Professor of Medicine*
- MARTIN EDWARD FLANAGAN, M.D. (1962) *Associate Professor of Neurosurgery*
- *TED BENJAMIN FLANAGAN, Ph.D. (1961) *Professor of Chemistry*
- THEODORE ROSS FLANAGAN, Ph.D. (1953) *Assistant Professor of Plant and Soil Science*
- RICHARD F. FLANNERY, M.A. (1970) *Assistant Professor of Political Science*
- SHARI B. FLEMING, M.M. (1970) *Instructor in Music*
- CHERYL A. FLOOD, B.S. (1970) *Instructor in Education*
- CURTIS M. FLORY, M.D. (1964) *Clinical Assistant Professor of Pathology*
- ARTHUR HOWARD FLOWER, JR., M.D. (1950) *Clinical Associate Professor of Dermatology*
- JOSEPH CLAYTON FOLEY, M.D. (1954) *Clinical Associate Professor of Radiology*
- *MURRAY WILBUR FOOTE, Ph.D. (1947-51; 1953) *Associate Professor of Microbiology and Biochemistry*
- DOROTHY ELLEN FORD, M.D. (Oct. 1968) *Assistant Professor of Rehabilitation Medicine*
- ELIZABETH M. FOREMAN, M.S.N. (Feb. 1969) *Instructor in Nursing*
- *DONALD G. FORGAYS, Ph.D. (1964) *Professor of Psychology*
- ROSE JULIET FORGIONE, M.A. (1964) *Associate Professor of Nursing*
- ELISABETH HERTA FORSBERG, M.D. (Jan. 1968) *Clinical Instructor in Psychiatry*
- BEN RALPH FORSYTH, M.D. (1966) *Clinical Professor of Medicine and Associate Professor of Microbiology*
- ELIZABETH HELD FORSYTH, (MRS. B. R.) M.D. (1967) *Instructor in Psychiatry*
- *DONALD CUSHING FOSS, Ph.D. (1968) *Assistant Professor of Animal Sciences*
- JUDITH L. FOSTER, B.S. (1970) *Instructor in Nursing*
- ROGER SHERMAN FOSTER, JR., M.D. (Jan. 1970) *Assistant Professor of Surgery*
- RAYMOND T. FOULDS, JR., M.F. (1948) *Adjunct Professor of Forestry*
- *WAYNE LENIS FOX, Ph.D. (1969) *Associate Professor of Education*
- EDGAR W. FRANCISCO III, Ph.D. (1972) *Adjunct Associate Professor of Economics and Business Administration*
- ROLAND G. FRANK, Ed.D. (1971) *Adjunct Assistant Professor of Education*
- *STEVEN LESLIE FREEDMAN, Ph.D. (1965) *Associate Professor of Anatomy*
- EDWARD ESAU FRIEDMAN, M.D. (1963) *Clinical Assistant Professor of Community Medicine*
- JOHN WILLARD FRYMOYER, M.D. (1969) *Assistant Professor of Orthopedic Surgery*
- *GERALD ROSS FULLER, Ed.D. (Aug. 1968) *Associate Professor of Vocational, Technical, Extension Education*
- ROBERT WEEKS FULLER, M.S. (Jan. 1966) *Adjunct Assistant Professor of Forestry*
- *DANIEL WAYNE GADE, Ph.D. (1966) *Associate Professor of Geography*
- *JAMES GERARD GALLAGHER, Ph.D. (Oct. 1969) *Instructor in Medical Microbiology*
- *JOSEPH HERBERT GANS, Ph.D. (1967) *Professor of Pharmacology*
- SERAFINO GARELLA, M.D. (1972) *Clinical Assistant Professor of Medicine*
- ALLEN F. GEAR, J.D. (1971) *Instructor in Economics and Business Administration*
- THOMAS HOWARD GENO, Ph.D. (1965) *Assistant Professor of Romance Languages*
- STOKES GENTRY, M.D. (1962) *Clinical Associate Professor of Pediatrics*
- ANTONIO ISAIAS GERMAN, M.D. (1965) *Clinical Instructor in Pathology*
- WALTER R. GIBBONS, Ph.D. (1971) *Assistant Professor of Physiology and Biophysics*
- KENNETH S. GIBSON, M.S. (1964) *Adjunct Assistant Professor of Animal Sciences*
- THOMAS CHOMETON GIBSON, M.B. (Dec. 1962) *Associate Professor of Community Medicine and Medicine*
- *ALPHONSE HENRY GILBERT, Ph.D. (1969) *Assistant Professor of Resource Economics*
- *BRADY BLACKFORD GILLELAND, Ph.D. (1957) *Professor of Classics*

- *RICHARD WILLIAM GLADE, Ph.D. (1958) *Professor of Zoology*
 ARTHUR A. GLADSTONE, M.D. (1933-36; 1941) *Clinical Professor of Surgery*
 CHARLES MORTON GLUCK, M.D. (1965) *Clinical Assistant Professor of Medicine*
 *ROBERT JOHN GOBIN, Ph.D. (1965) *Associate Professor of Physical Education*
 ERIC P. GODFREY, M.A. (1970) *Instructor in Sociology*
 RICHARD HERRON GOLDSBOROUGH, M.D. (Oct. 1961) *Clinical Assistant Professor of Otolaryngology*
 STEVEN G. GOLDSTEIN, Ph.D. (1970) *Associate Professor of Psychology and Clinical Associate Professor of Psychiatry*
 ARNOLD GOLODETZ, M.D. (1969) *Associate Professor of Medicine and Rehabilitation Medicine*
 ANTONIO J. GOMEZ, M.D. (1970) *Assistant Professor of Neurology*
 LAWRENCE R. GORDON, Ph.D. (1970) *Assistant Professor of Psychology*
 *LYMAN JAY GOULD, Ph.D. (1953) *Professor of Political Science*
 WILLIAM G. GRAHAM, M.D. (1971) *Associate Professor of Medicine*
 *ARMIN E. GRAMS, Ph.D. (1971) *Professor of Human Development*
 GORNELIUS O. GRANA, JR., M.D. (1967) *Clinical Instructor in Obstetrics and Gynecology*
 RICHARD L. GRANT, M.D. (1971) *Associate Professor of Psychiatry*
 DUANE EDGAR GRAVELINE, M.D. (1966) *Clinical Instructor in Medicine*
 DAVID HENRY GRAY, M.D. (1962) *Clinical Instructor in Community Medicine*
 JUDITH E. GRAY, M.S. (1970) *Instructor in Nursing*
 MARY JANE GRAY, M.D. (1960) *Professor of Obstetrics and Gynecology*
 GARETH MONTRAVILLE GREEN, M.D. (1968) *Associate Professor of Medicine*
 JAME A. GREENBERG, M.S. (1969) *Instructor in Education*
 DONALD CROWTHER GREGG, Ph.D. (1946) *Pomeroy Professor of Chemistry*
 *EDWIN CHARLES GREIF, M.S. (1950) *Professor of Economics and Business Administration*
 HAROLD ALFRED GREIG, M.P.E. (Feb. 1962) *Assistant Professor of Physical Education*
 JACKIE M. GRIBBONS, M.A. (1966) *Adjunct Assistant Professor of Education*
 PAUL T. GROSS, JR., Ph.D. (1971) *Associate Professor of Economics and Business Administration*
 RICHARD GORDON GRUNDLER, D.D.S. (1969) *Instructor in Dental Hygiene*
 HOWARD THEODORE GUARE, M.D. (1952) *Clinical Assistant Professor of Radiology*
 SALLY C. GUERETTE, M.S.Ed. (1969) *Instructor in Physical Education*
 ROBERT CESARE GUIDULLI, M.D. (1966) *Clinical Assistant Professor of Ophthalmology*
 DIETER WALTER GUMP, M.D. (1966) *Associate Professor of Medicine and Assistant Prof. of Microbiology*
 WALTER D. GUNDEL, M.D. (1971) *Assistant Professor of Medicine*
 ROBERT ERWIN GUSSNER, S.T.B. (1969) *Instructor in Philosophy and Religion*
 STANLEY T. GUTMAN, M.A. (1971) *Assistant Professor of English*
 CARLETON RAYMOND HAINES, M.D. (1950-52; 1954) *Clinical Assistant Professor of Surgery*
 PUZANT SETRAK HALEBIAN, D.D.S. (Oct. 1965) *Assistant Professor of Dental Hygiene*
 CYNTHIA A. HALL, B.S. (1971) *Teaching Associate in Nursing*
 *MARY STARRITT HALL (MRS. R. W.) Ph.D. (1961-62; 1965) *Assistant Professor of English*
 *ROBERT WILLIAM HALL, Ph.D. (1957) *Professor of Philosophy and Religion*
 WILLIAM DENNIS HALLORAN, M.A. (1971) *Adjunct Assistant Professor of Vocational, Technical, and Extension Education*
 *WILLIAM HALPERN, Ph.D. (Aug. 1969) *Assistant Professor of Physiology and Biophysics*
 BURT BENJAMIN HAMRELL, M.D. (Aug. 1968) *Assistant Professor of Physiology and Biophysics and Clinical Instructor in Medicine*
 *SAMUEL B. HAND, Ph.D. (Feb. 1961) *Professor of History*
 *MORRIS HANDELSMAN, Ph.D. (1969) *Professor of Electrical Engineering*
 *EDWARD MICHAEL HANLEY, Ph.D. (1969) *Assistant Professor of Education*
 *PETER ROBERT HANNAH, Ph.D. (Jan. 1967) *Associate Professor of Forestry*
 HEDRIC B. HANSON, M.D. (1970) *Clinical Instructor in Obstetrics and Gynecology*
 JOHN SHERWOOD HANSON, M.D. (1958) *Professor of Medicine*
 WILLIAM C. HAPONSKI, Ph.D. (1971) *Professor of Military Science*
 MONTE R. HAROLD, M.W.T. (1970) *Adjunct Assistant Professor of Forestry*
 LAWRENCE STANLEY HARRIS, M.D. (Aug. 1968) *Assistant Professor of Pathology*
 *BETH A. HART, Ph.D. (1970) *Assistant Professor of Biochemistry*
 JOHN ELLIS HARTFORD, M.D. (Dec. 1969) *Assistant Professor of Anesthesiology*

- WILLIAM A. HARTMAN, M.A. (1971) *Instructor in Music*
 JOHN F. HARWOOD, B.S. (1964) *Lecturer in Radiological Safety*
 JOSEPH E. HASAZI, M.A. (1970) *Assistant Professor of Psychology*
 *ROLF N. B. HAUGEN, Ph.D. (1947) *Professor of Political Science*
 *WILLIAM A. HAVILAND, Ph.D. (1965) *Associate Professor of Sociology and Anthropology*
- MARGARET ELLEN HAYES, M.S. (1966) *Specialist of Physical Education*
 RICHARD S. HEILMAN, M.D. (1968) *Assistant Professor of Radiology*
 CALEF E. HEININGER, SR., D.D.S. (1970) *Instructor in Dental Hygiene*
 PAUL LEHMANN HEININGER, D.D.S. (1950) *Associate Professor of Dental Hygiene*
 JOHN WILBUR HEISSE, JR., M.D. (1956) *Clinical Assistant Professor of Otolaryngology*
 *E. BENNETTE HENSON, Ph.D. (1965) *Professor of Zoology*
 FRANCIS R. HEWITT, M.A. (1970) *Assistant Professor of Art*
 DANIEL W. HIGGINS, M.F.A. (1969) *Instructor in Art*
 RAUL HILBERG, Ph.D. (Feb. 1956) *Professor of Political Science*
 *DAVID BYRNE HILL, Ph.D. (1965) *Associate Professor of Mathematics*
 ROBERT P. HO, M.A. (1970) *Instructor in Education*
 FRANKLIN THEODORE HOAGLUND, M.D. (Feb. 1968) *Professor of Orthopedic Surgery*
- WILLIAM ELWIN HODGKIN, M.D. (Oct. 1964) *Associate Professor of Pediatrics*
 JANET M. HODNETT, B.S. (1971) *Adjunct Instructor in Medical Technology*
 THOMAS WAYNE HOEKSTRA, Ph.D. (Feb. 1970) *Assistant Professor of Forestry*
 ROBERT ADAMS HOLDEN, M.D. (1966) *Clinical Assistant Professor of Medicine*
 J. LORIMER HOLM, M.D. (1970) *Clinical Instructor in Radiology*
 ANNE CAROLINE DODGE HOOPER, M.D. (April 1967) *Clinical Instructor in Pathology*
 *RICHARD JOHN HOPP, M.S. (1947) *Professor of Plant and Soil Science*
 GABRIEL R. HORST, Ph.D. (1971) *Assistant Professor of Anatomy*
 EDWARD SCHURR HORTON, M.D. (1967) *Associate Professor of Medicine*
 VERLE R. HOUGHABOOM, Ph.D. (1947) *Adjunct Professor of Resource Economics*
 MARTHA HILTON HOUGHTON, Ed.M. (Jan. 1970) *Lecturer in Speech*
 CHARLES SNEAD HOUSTON, M.D. (Aug. 1966) *Professor of Community Medicine*
 BARBARA J. HOWARD, B.S. (1970) *Instructor in Home Economics*
 PHILLIP LLOYD HOWARD, M.D. (1969) *Assistant Professor of Pathology*
 *JAMES ROBINSON HOWE, Ph.D. (1964) *Assistant Professor of English*
 *DAVID CHARLES HOWELL, Ph.D. (1967) *Assistant Professor of Psychology*
 WALLACE J. HOWELL, JR., Ph.D. (1971) *Assistant Professor of Communication and Theatre*
- ROBERT BRUCE HUBER, Ph.D. (1946) *Edwin P. Lawrence Forensic Professor of Speech*
 DAVID R. HUDDLE, M.A. (1971) *Instructor in English*
 HANS ROSENSTOCK HUESSY, M.D. (1960) *Professor of Psychiatry*
 MARCE E. HULL, M.Ed. (1971) *Instructor in Vocational, Technical, and Extension Education*
- *MAHENDRA SINGH HUNDAL, Ph.D. (1967) *Associate Professor of Mechanical Engineering*
- *ALLEN STANDISH HUNT, Ph.D. (Feb. 1961) *Associate Professor of Geology*
 *LYMAN CURTIS HUNT, JR., D.Ed. (1966) *Professor of Education*
 ROBERT JACOB HUNZIKER, M.D. (Jan. 1963) *Associate Professor of Radiology*
 GARY R. HUSTED, M.S. (1971) *Instructor in Microbiology and Biochemistry*
 *PATRICK H. HUTTON, Ph.D. (1968) *Assistant Professor of History*
 *BEAL BAKER HYDE, Ph.D. (1965) *Professor of Botany*
 ROBERT WELLS HYDE, M.D. (Oct. 1967) *Clinical Associate Professor of Psychiatry*
 JUDITH ANN INGALLS, B.S. (Jan. 1970) *Instructor in Dental Hygiene*
 EDWARD SUTER IRWIN, M.D. (Jan. 1963) *Clinical Associate Professor of Ophthalmology*
- ELIZABETH E. ISHAM, B.S. (1969) *Adjunct Instructor in Medical Technology*
 *YOSHINORI ISHIKAWA, Ph.D. (1968) *Instructor in Biochemistry*
 *JOSEPH ANTHONY IZZO, Ph.D. (1956) *Professor of Mathematics*
 LOUIS MARIO IZZO, M.S. (1969) *Instructor in Radiologic Physics*
 JESSIE A. JACOBS, M.F.A. (1971) *Instructor in the Experimental Program*
 *JULIAN JOSEPH JAFFE, Ph.D. (1961) *Professor of Pharmacology*
 RICHARD H. JAGELS, Ph.D. (1969) *Adjunct Assistant Professor of Botany*
 GLADYS MARGARET JAMESON, M.Ed. (1968) *Assistant Professor, Human Development*
 CLINTON DALES JANNEY, Ph.D. (1959) *Professor of Radiology*
 RICHARD HARRY JANSON, Ph.D. (1958) *Professor of Art*
 *WILLIAM J. JEWELL, Ph.D. (1970) *Assistant Professor of Civil Engineering*

- *JUSTIN MANFRED JOFFE, Ph.D. (1969) Associate Professor of Psychology
 JAN ERIK HUBERT JOHANSSON, M.A. (1969) Instructor in Mathematics
 ROBERT J. JOHNSON, M.D. (1971) Assistant Professor of Orthopaedic Surgery
 ELBRIDGE EUGENE JOHNSTON, M.D. (1951) Clinical Assistant Professor of Medicine
 *STUART LYNDE JOHNSTON, Ph.D. (1940-42; 1943-44; 1946) Professor of Romance Languages
 W. HERBERT JOHNSTON, M.D. (1952) Assistant Professor of Radiology
 *DONALD BOYES JOHNSTONE, Ph.D. (1948) Professor of Microbiology and Biochemistry
 JANICE L. JONES, Ph.D. (1970) Assistant Professor of Medical Technology
 *LEONIDAS MONROE JONES, Ph.D. (1951) Professor of English
 WARNER EDRICK JONES, M.D. (Jan. 1968) Clinical Instructor in Medicine
 HORACE W. JOSSELYN, D.D.S. (1971) Instructor in Dental Hygiene
 *DAVID W. JÜENKER, Ph.D. (1964) Professor of Physics
 *ROY GEORGE JULOW, Ph.D. (1957) Associate Professor of Romance Languages
 HARRY HELMUTH KAHN, M.A. (1948-53; 1954) Associate Professor of German
 WILLIAM F. KANAR, M.D. (1971) Clinical Assistant Professor of Psychiatry
 ROBERT E. KANICH, M.D. (1969) Assistant Professor of Pathology
 BRUCE S. KAPP, Ph.D. (1971) Assistant Professor of Psychology
 ALBERT GUSTAV KASENTER, A.B. (1967) Lecturer in Radiologic Physics
 IRWIN SEYMOUR KAYE, M.D. (1966) Assistant Professor of Pathology
 ROBERT E. KEEN, Ph.D. (1971) Assistant Professor of Zoology
 PHILIP CONBOY KELLEHER, M.D. (1963) Associate Professor of Medicine
 JAY EDGAR KELLER, M.D. (1950) Clinical Assistant Professor of Surgery
 WILLIAM HOWARD KELLY, Ph.D. (1969) Assistant Professor of Vocational, Technical, and Extension Education
 ELMORE M. KENNEDY, JR., Ph.D. (1971) Adjunct Professor of Mechanical Engineering
 *MARCZ. KESSLER, Ph.D. (1969) Assistant Professor of Psychology
 DONALD E. KEYSER, Ph.D. (1964) Adjunct Assistant Professor of Home Economics
 ALEXANDER KEYSAR, M.D. (1971) Clinical Associate Professor of Medicine
 *JOHN L. KICE, Ph.D. (1970) Professor of Chemistry
 DANIEL U. KILEY (1970) Adjunct Professor of Civil Engineering
 *DAVID LESLIE KINSEY, Ph.D. (1950) Associate Professor of Music
 FLORA ELIZABETH KINSEY, (MRS. D. L.) (1969) Instructor in Music
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 THOMAS ROBERT KLEH, M.D. (1965) Clinical Assistant Professor of Ophthalmology
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 *RICHARD M. KLEIN, Ph.D. (1967) Professor of Botany
 MARTHA F. KNIGHT, M.Ed. (1968) Instructor in Education
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 MAURICE EMILE KOHLER, Ph.D. (1965) Associate Professor of Romance Languages
 MOLLY F. KOHLER, M.A. (1970) Instructor in English
 *ROY KORSON, M.D. (1950-52; 1954) Professor of Pathology
 *ANDREW PAUL KRAPCHO, Ph.D. (1960) Professor of Chemistry
 EDWARD L. KRAWITT, M.D. (June 1969) Assistant Professor of Medicine
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 *JOHN ERNEST KRIZAN, Ph.D. (1962) Professor of Physics
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 RICHARD P. KUKLIS, M.B.A. (1970) Assistant Professor of Economics and Business Administration
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 EDWARD ANTHONY KUPIC, M.D. (Oct. 1966) Associate Professor of Radiology
 EDWARD THADDEUS KUSIAK, M.Ed. (1969) Instructor in Physical Education
 *BERT KARL KUSSEROW, M.D. (Oct. 1959) Professor of Pathology
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 IRIS I. LACASSE (1971) Adjunct Instructor, Division of Health Sciences
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 *DAVID CHIN LAI, Eng.D. (1965) Professor of Electrical Engineering
 DENIS EMERY LAMBERT, M.A.T. (1964) Associate Professor of Physical Education
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- BETTY J. LATES, M.Ed. (1970) *Instructor of Education*
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- HERBERT L. LEFF, Ph.D. (1970) *Assistant Professor of Psychology*
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- *HARRY LIGHTHALL, JR., Ph.D. (1955) *Professor of Mathematics*
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 ROBERT JAMES McKAY, JR., M.D. (1949) *Professor of Pediatrics*
 MARION CLAIRE McKEE, M.D. (1958) *Clinical Associate Professor of Pediatrics and Clinical Instructor in Neurology*
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 CARLTON DEAN MARSHALL, M.D. (1966) *Clinical Assistant Professor of Psychiatry*
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 KATHLEEN AUDREY MARSLAND, M.S. (1964) *Assistant Professor of Nursing*
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 HERBERT L. MARTIN, M.D. (1965) *Professor of Neurology*
 LUTHER HOWARD MARTIN, JR., Ph.D. (1967) *Assistant Professor of Philosophy and Religion*
 *FRANK MARTINEK, Ph.D. (1967) *Associate Professor of Mechanical Engineering*
 *JAMES WALLACE MARVIN, Ph.D. (1939) *Professor of Botany*
 ROBERT L. MASSONEAU, M.D. (1968) *Clinical Instructor in Medicine*
 HUNTINGTON MAVOR, M.D. (Aug. 1969) *Associate Professor of Neurology*
 ROBERT ARTHUR MAXWELL, Ph.D. (1962-65; 1967) *Visiting Professor of Pharmacology*
 JOHN EDMUND MAZUZAN, JR., M.D. (1959) *Professor of Anesthesiology*
 PHILIP B. MEAD, M.D. (1971) *Assistant Professor of Obstetrics and Gynecology*
 AUDREY W. MEADER, M.A. (1972) *Teaching Associate in Teacher Education Program*
 CORNELIUS IRVING MEEKER, M.D. (1962) *Associate Professor of Obstetrics and Gynecology*
 HAROLD AUSTIN MEEKS, Ph.D. (1964) *Associate Professor of Geography*
 R. W. PAUL MELLISH, M.B. (1963) *Associate Professor of Pediatric Surgery*
 *DONALD BURTON MELVILLE, Ph.D. (1960) *Professor of Biochemistry*
 DONALD J. MERCHANT, Ph.D. (1969) *Professor of Medical Microbiology*
 JOHN D. MERCHANT, B.S. (1949) *Adjunct Professor, Extension*

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EDWARD F. MERRILL, B.S. (1969) *Adjunct Instructor in Medical Technology*
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*BRUCE ELWYN MESERVE, Ph.D. (1964) *Professor of Mathematics*
MARION ELIZABETH METCALFE, (MRS. W. C.) B.A. (1966) *Instructor in Music*
*WILLIAM CRAIG METCALFE, Ph.D. (1963) *Associate Professor of History*
*WILLIAM LAROS MEYER, Ph.D. (1962) *Associate Professor of Biochemistry*
HERMAN W. MEYERS, Ph.D. (1971) *Assistant Professor of Education*
*GARY KEITH MICHAEL, M.B.A., C.P.A. (1965) *Associate Professor of Economics and Business Administration*
WOLFGANG MIEDER, Ph.D. (1971) *Assistant Professor of German*
REGINALD VENN MILBANK, M.S. (1946-48; 1949) *Professor of Civil Engineering*
*EDWARD JERVIS MILES, Ph.D. (1962) *Professor of Geography*
RAYMOND LEE MILHOUS, M.D. (Feb. 1968) *Associate Professor of Rehabilitation Medicine*
DAVID ALLISON MILLER, M.S. (Dec. 1969) *Assistant Professor of Community Medicine*
DONALD BARKER MILLER, M.D. (1951) *Clinical Associate Professor of Thoracic and Cardiac Surgery*
WILLARD MARSHALL MILLER, Ph.D. (1969) *Assistant Professor of Philosophy and Religion*
JEAN BEATTIE MILLIGAN, M.Ed. (1953) *Professor of Nursing*
ISABEL CLARK MILLS, M.A. (1932) *Associate Professor of Art*
JOHN HOLLISTER MILNE, M.D. (1964) *Clinical Assistant Professor of Medicine*
HOWARD JAY MINDELL, M.D. (Oct. 1967) *Assistant Professor of Radiology*
KEITH M. MISER, Ed.D. (1971) *Assistant Professor of Education*
WILLIAM EDWARD MITCHELL, Ph.D. (1967) *Associate Professor of Psychiatry*
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MAUREEN KATHERINE MOLLOY, M.D. (1968) *Clinical Assistant Professor of Orthopedic Surgery*
MAURICE EDWARD MONGEON, M.D. (Oct. 1966) *Clinical Assistant Professor of Medicine*
DALE BISHOP MONTGOMERY, D.M.D. (Feb. 1965) *Assistant Professor of Dental Hygiene*
PAUL AMOS MOODY, Ph.D. (1927) *Howard Professor of Natural History and Zoology*
*JOHN W. MOORE, D.Ed. (1970) *Assistant Professor of Education*
MILO J. MOORE, M.S. (1969) *Adjunct Assistant Professor of Agricultural Engineering*
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JOSEPHINE ANN MORGAN, D.N. (Oct. 1969) *Instructor in Obstetrics and Gynecology Nursing*
PAUL MICHAEL MORRISSEAU, M.D. (Jan. 1970) *Assistant Professor of Urology*
JAMES R. MORROW, M.A. (1970) *Instructor in Mathematics*
RUFUS CLEGG MORROW, M.D. (1951) *Professor of Otolaryngology*
*ELLEN HASTINGS MORSE, Ph.D. (1960) *Professor, Nutrition*
*DONALD EUGENE MOSER, Ph.D. (1960) *Professor of Mathematics*
MICHAEL JEROME MOYNIHAN, M.D. (1966) *Clinical Associate Professor of Medicine*
H. NICHOLAS MULLER, III, Ph.D. (1966) *Associate Professor of History*
TIMOTHY MURAD, B.A. (1971) *Instructor in Romance Languages*
MICHAEL P. MURPHY, B.A. (1970) *Instructor in Physical Education*
RICHARD E. MURPHY, M.D. (1970) *Clinical Assistant Professor in Obstetrics and Gynecology*
BARBARA LEE SPAULDING MURRAY, M.S. (Mar. 1968) *Assistant Professor of Nursing*
JOHN JOSEPH MURRAY, M.D. (1968) *Clinical Instructor in Pediatrics*
ROGER WALTER MURRAY, D.V.M. (1968) *Associate Professor of Animal Pathology*
*RICHARD E. MUSTY, Ph.D. (Jan. 1968) *Assistant Professor of Psychology*
CHARLES CHROSTOPHER MYERS, Ph.D. (1969) *Assistant Professor of Forestry*
*MILTON JOSEPH NADWORN, Ph.D. (1952) *Professor of Economics and Business Administration*
STEPHEN WILLIAM NAGY, Ph.D. (1969) *Assistant Professor of Physics*
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GARRISON NELSON, M.A. (1968) *Instructor in Political Science*

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 DAVID S. NEWCOMBE, M.D. (Oct. 1967) *Associate Professor of Medicine*
 BEVERLY A. NICHOLS, Ph.D. (1971) *Associate Professor of Physical Education*
 GEORGE HUBERT NICHOLSON, M.A. (1923) *Associate Professor of Mathematics*
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 ALEXANDER NIES, M.D. (1965) *Associate Professor of Psychiatry*
 *KAY MILLIGAN NILSON, Ph.D. (Aug. 1966) *Associate Professor of Animal Sciences*
 HOWARD L. NIXON, II, Ph.D. (1970) *Assistant Professor of Sociology*
 *CHARLES PRYOR NOVOTNY, Ph.D. (1968) *Assistant Professor of Medical Microbiology*
 MITSUO NUMOTO, M.D. (1962) *Associate Professor of Neurosurgery*
 MANUEL NUNEZ-de-CELA, M.A. (1970) *Instructor in Romance Languages*
 *ANDREW EDGERTON NUQUIST, Ph.D. (1938) *McCullough Professor of Political Science*
 *WESLEY LEMARS NYBORG, Ph.D. (1960) *Professor of Physics*
 *ELBERT AUSTIN NYQUIST, M.S., C.P.A. (1953) *Professor of Economics and Business Administration*
 JOSEPH H. OAKLEY, Ed.M. (1970) *Adjunct Associate Professor of Education*
 ROBERT EMMETT O'BRIEN, M.D. (1956) *Clinical Associate Professor of Medicine*
 PATRICIA A. O'HARA (1971) *Instructor in Obstetrics and Gynecology*
 HIDEO OKINO, B.F.A. (1970) *Instructor in Art*
 DONALD CLARK OLIVEAU, M.D. (1968) *Assistant Professor of Psychiatry*
 HERLUF V. OLSEN, JR., M.H.A. (Oct. 1967) *Professor of Hospital Administration*
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 *JOSEPH CLARENCE OPPENLANDER, Ph.D. (Jan. 1969) *Professor of Civil Engineering*
 ROY W. ORTEL, M.D. (1971) *Assistant Professor of Medicine*
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 *JOHN OGDEN OUTWATER, Sc.D. (1956) *Professor of Mechanical Engineering*
 *JAMES HARRIS OVERFIELD, Ph.D. (1968) *Assistant Professor of History*
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 PAUL PAGANUZZI, Ph.D. (1961) *Professor of Russian*
 DOROTHY PAGE, B.S. (1971) *Assistant Professor of Physical Therapy*
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 *IPPOCRATES PAPPOUTSAKIS, M.Mus. (1940) *Professor of Music*
 DAVID RAYMOND PARK, M.D. (1969) *Clinical Assistant Professor of Medicine*
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 *DONALD STETSON ROBINSON, M.D. (1968) *Associate Professor of Medicine and Pharmacology*
- LINDA J. RODD, M.A. (1971) *Instructor in Psychology*
 ALICE KELLY RODGERS, M.S. (1962) *Assistant Professor of Nursing*
 MARGARET DAMM ROLAND, Ph.D. (1966) *Assistant Professor of Art*
 JON ERIK ROLF, Ph.D. (Jan. 1970) *Assistant Professor of Psychology*
 *ALFRED BROOKS ROLLINS, JR., Ph.D. (1967) *Professor of History*
 DIRK ROMEYN, M.D. (1967) *Clinical Instructor in Obstetrics and Gynecology*
 ALFRED FELIX ROSA, Ph.D. (1969) *Assistant Professor of English*
 MERRILL J. ROSENFELD, M.A. (171) *Instructor in Neurology*
 CHARLES ROBERT ROSS, L.L.B. (Jan. 1969) *Adjunct Professor of Economics and Business Administration*
- *WILFRED ROTH, Ph.D. (1964) *Professor of Electrical Engineering*
 WILLIAM D. ROTH, Ph.D. (1971) *Assistant Professor of Political Science*
 *HOWARD ROTHSTEIN, Ph.D. (1962) *Professor of Zoology*
 *KENNETH S. ROTHWELL, Ph.D. (1970) *Professor of English*
 M. PAULINE ROWE, M.Ed. (1939) *Adjunct Professor, Extension*
 VIRGINIA C. RUDWICK, M.T.D. (1970) *Instructor in Obstetrics and Gynecology*

- BARBARA McNEIL RULE, M.Ed. (Feb. 1969) *Instructor in Nursing*
 CARL FREDERICK RUNGE, M.D. (1969) *Assistant Professor of Medicine*
 *STANLEY RUSH, Ph.D. (1962) *Professor of Electrical Engineering*
 ELEANOR MARY RUSSELL, B.S. (1967) *Instructor in Medical Technology*
 JOSEPH N. RUSSO, M.D. (1968) *Clinical Assistant Professor of Obstetrics and Gynecology*
- CHARLES BRUSH RUST, M.D. (1948) *Clinical Associate Professor of Orthopedic Surgery*
 FRANCIS P. RYAN, M.D. (1971) *Clinical Instructor in Pediatrics*
 WILLIAM JOHN RYAN, M.D. (Jan. 1970) *Clinical Assistant Professor in Medicine*
 RICHARD ALAN RYDER, M.D. (1967) *Assistant Professor of Medicine*
 THOMAS DUDLEY SACHS, Ph.D. (Feb. 1962) *Assistant Professor of Physics*
 *ALBERT WILLIAM SADLER, Ph.D. (1956) *Professor of Philosophy and Religion*
 HARVEY SALGO, M.A. (1969) *Assistant Professor of Economics and Business Administration*
- *FREDERIC OBERLIN SARGENT, Ph.D. (Aug. 1962) *Professor of Resource Economics*
 KENNETH P. SAURMAN, D.Ed. (1970) *Assistant Professor of Education*
 LOIS SAVIN, B.S. (1972) *Adjunct Instructor of Nursing*
 WADI ISSA SAWABINI, D.D.S. (1951) *Associate Professor of Dental Hygiene*
 JANET RUTH SAWYER, Ph.D. (1968) *Associate Professor of Nursing*
 *ROBERT NEWTON SAXBY, M.D. (1954) *Assistant Professor of Radiology*
 JANET M. SCANLON, B.S. (1969) *Adjunct Instructor in Medical Technology*
 *LEONARD MICHAEL SCARFONE, Ph.D. (1963) *Professor of Physics*
 STEPHEN A. SCHACHER, M.D. (1971) *Assistant Professor of Medicine*
 *WARREN IRA SCHAEFFER, Ph.D. (Dec. 1967) *Associate Professor of Medical Microbiology*
- WILLIAM MURRELL SCHENK, M.A. (1965) *Assistant Professor of Communication and Theatre*
- *ROBIN RUDOLF SCHLUNK, Ph.D. (1967) *Associate Professor of Classics*
 CARL LUDWIG SCHMIDER, M.A. (1968) *Instructor in Communication & Theatre*
 FREDERICK E. SCHMIDT, M.S. (1970) *Assistant Professor of Sociology*
 *WOLFE WILHELM SCHMOKEL, Ph.D. (1962-64; 1965) *Professor of History*
 BETSY SCHNEIDER, A.B. (1968) *Instructor in Education*
 EDWIN CALVIN SCHNEIDER, M.S. (1946) *Professor of Agricultural Engineering*
 *PETER SCHOFIELD, D.Ph. (1970) *Assistant Professor of Biochemistry*
 N. JAMES SCHOONMAKER, Ph.D. (1956) *Professor of Mathematics*
 *HAROLD SEESSEL SCHULTZ, Ph.D. (1946) *Professor of History*
 *HERBERT LOUIS SCHULTZ, Ed.D. (1957) *Associate Professor of Music*
 J. DONALD SCHULTZ, M.D. (April 1970) *Assistant Professor of Community Medicine*
 GEORGE ADAM SCHUMACHER, M.D. (1950) *Professor of Neurology*
 ROBERTA B. SCHWALB, M.A. (1958) *Associate Professor of Nursing and Clinical Assistant Professor of Obstetrics and Gynecology*
- JO ANN SCRANTON, M.S. (1968) *Assistant Professor in Nursing*
 FINLEY ALEXANDER SEAGLE, M.D. (1969) *Clinical Instructor in Medicine*
 KENNETH A. SEID, Ph.D. (1970) *Assistant Professor of English*
 MALCOLM FLOYD SEVERANCE, Ph.D. (1951-52; 1953) *Associate Professor of Economics and Business Administration*
- *PETER JORDAN SEYBOLT, Ph.D. (1969) *Assistant Professor of History*
 JAMES DOUGLAS SHARPE, M.D. (Jan. 1965) *Clinical Assistant Professor of Psychiatry*
 WILLIAM IRELAND SHEA, M.D. (1952) *Clinical Assistant Professor of Surgery*
 *ALLEN GLASS SHEPHERD, III, Ph.D. (1965) *Associate Professor of English*
 ELIZABETH ANNE SHERMAN, B.S. (1969) *Instructor in Art*
 TAMOTSU SHINOZAKI, M.D. (1967) *Assistant Professor of Anesthesiology*
 LESTER SILBERMAN, M.D. (1971) *Assistant Professor of Obstetrics and Gynecology*
 *KENNETH ROGERS SIMMONS, Ph.D. (Jan. 1963) *Associate Professor of Animal Sciences*
- MORRIS LEON SIMON, M.A. (1954) *Associate Professor of Political Science*
 RENO THOMAS SIMONE, JR., M.A. (1968) *Instructor in English*
 JAMES EDWIN SIMPSON, M.D. (1953) *Clinical Assistant Professor of Orthopedic Surgery*
- ETHAN ALLEN HITCHCOCK SIMS, M.D. (1950) *Professor of Medicine*
 WARREN FREDERICK SIMS, JR., M.D. (1966) *Assistant Professor of Obstetrics and Gynecology*
- *ROBERT ORVILLE SINCLAIR, Ph.D. (1953-55; 1956) *Professor of Resource Economics*
 *ROBERT ERIK SJOGREN, Ph.D. (1967) *Associate Professor of Microbiology and Biochemistry*
- DOROTHY D. SLACK, M.S. (1971) *Instructor in Physical Education*

- HOWARD DARRELL SLACK, D.D.S. (1950) *Assistant Professor of Dental Hygiene*
 WILLIAM JOSEPH SLAVIN, M.D. (May 1943) *Professor of Obstetrics and Gynecology*
 MARY GREENLAW SLOANAKER, B.S. (1968) *Instructor in Dental Hygiene*
 *ALBERT MATTHEW SMITH, Ph.D. (1957) *Professor of Animal Sciences*
 DENNIS BERNARD SMITH, M.D. (Dec. 1969) *Assistant Professor of Neurology*
 *DURWOOD JAMES SMITH, M.D. (Jan. 1953) *Professor of Pharmacology*
 JAMES P. SMITH (1971) *Adjunct Instructor in Radiologic Technology*
 MARK E. SMITH, M.A. (1970) *Instructor in Education*
 NEIL GIBSON SMITH, M.A. (1968) *Lecturer in Communication and Theatre*
 PHYLLIS E. SMITH, Ph.D. (1971) *Associate Professor of Communication and Theatre*
 WALTER D. SODERBERG, M.Ed. (1970) *Assistant Professor of Physical Education*
 SAMUEL SOLOMON, Ph.D. (1968) *Visiting Professor of Obstetrics and Gynecology*
 FELIX SOMMER, M.D. (Jan. 1965) *Clinical Instructor in Psychiatry*
 ARTHUR BRADLEY SOULE, JR., M.D. (1929) *Professor of Radiology*
 M. PHYLLIS SOULE, B.S. (1968) *Instructor in Home Economics*
 JOHN W. SPAVEN, B.S. (1945) *Adjunct Professor, Extension*
 *THOMAS JOHN SPINNER, JR., Ph.D. (1957-59; 1962) *Associate Professor of History*
 *THOMAS SPROSTON, JR., Ph.D. (1946) *Professor of Botany*
 DEBORAH T. SPURLOCK, B.S. (1970) *Instructor in Nursing*
 *HORACE HARRISON SQUIRE, Ph.D. (1962) *Associate Professor of Economics and Business Administration*
 JAMES WARD STACKPOLE, M.D. (1962) *Clinical Associate Professor of Pediatrics*
 *ROBERT EVERETT STANFIELD, Ph.D. (1969) *Associate Professor of Sociology and Anthropology*
 PAUL BYRON STANILONIS, M.D. (1969) *Clinical Assistant Professor of Medicine*
 *ROLFE SEATON STANLEY, Ph.D. (1964) *Associate Professor of Geology*
 MICHAEL N. STANTON, B.A. (1971) *Assistant Professor of English*
 ERNEST STARK, M.D. (1945) *Associate Professor of Pathology*
 JOHN NEWHALL STARK, M.D. (Jan. 1967) *Clinical Instructor in Psychiatry*
 *STANISLAW JAN STARON, Ph.D. (1961) *Professor of Political Science*
 RICHARD S. STAUDT, Ph.D. (1971) *Adjunct Assistant Professor of Education*
 BURDETT KINNEY STEARNS, Ph.D. (Nov. 1965) *Adjunct Assistant Professor of Civil Engineering*
 DORIS H. STEELE, Ph.D. (1959) *Adjunct Professor, Extension*
 DAVID A. SCRASE, B.A. (1971) *Instructor in German*
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 CARYL J. STEWART, M.S.W. (1968) *Clinical Instructor in Psychiatry*
 *WARREN R. STINEBRING, Ph.D. (Dec. 1967) *Professor of Medical Microbiology*
 DOLORES S. STOCKER, Ph.D. (1971) *Associate Professor of Education*
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 WILLIAM HAYDN STOUCH, M.D. (1967) *Clinical Assistant Professor of Medicine*
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 KATHLEEN R. STRASSBURG, (Mrs. N. K.), M.A.T. (1965) *Adjunct Assistant Professor of Home Economics*
 NORMAN KENNETH STRASSBURG, M.Ed. (1946) *Assistant Professor of Physical Education*
 *MICHAEL JOHN STRAUSS, Ph.D. (1968) *Assistant Professor of Chemistry*
 LINDA R. SUESS, M.S. (1970) *Instructor in Nursing*
 RICHARD I. SUGARMAN, M.A. (1970) *Instructor in Philosophy and Religion*
 ANNE M. SULLIVAN, M.S. (1969) *Instructor in Medical Technology*
 GERALD W. SWANSON, M.A. (1971) *Instructor in Philosophy and Religion*
 DONALD REED SWARTZ, M.D. (1967) *Clinical Assistant Professor of Pediatrics*
 *DAVID LUTHER SYLWESTER, Ph.D. (1965) *Associate Professor of Mathematics and Community Medicine*

- RICHARD L. SZABO, M.S. (1970) *Instructor in Physical Education*
 BURTON SAMUEL TABAKIN, M.D. (1954) *Professor of Medicine*
 DAVID LATHAM TABER, M.D. (1953) *Clinical Assistant Professor of Obstetrics and Gynecology*
 JOHN PETER TAMPAS, M.D. (1962) *Professor of Radiology*
 RICHARD LAURENCE TANNEN, M.D. (Mar. 1969) *Assistant Professor of Medicine*
 JOHN S. TANNER, M.D. (1970) *Clinical Instructor in Pediatrics*
 LEONARD J. TASHMAN, Ph.D. (1971) *Assistant Professor of Economics and Business Administration*
 *CHARLES FRANCIS TAYLOR, Ph.D. (Feb. 1964) *Associate Professor of Electrical Engineering*
 FRED HERBERT TAYLOR, Ph.D. (1943) *Professor of Botany*
 HOWARD CANNING TAYLOR, III, M.D. (1962) *Associate Professor of Pathology*
 CHRISTOPHER MARLOWE TERRIEN, M.D. (1939) *Clinical Associate Professor of Medicine*
 ANDREW TESSMANN, B.S. (1954) *Adjunct Professor of Agricultural Engineering*
 LOUIS GEORGE THABAULT, M.D. (1939) *Clinical Assistant Professor of Surgery*
 WILFRED LOUIS THABAULT, M.D. (Jan. 1958) *Clinical Assistant Professor of Obstetrics and Gynecology*
 *JOHN WALTER THANASSI, Ph.D. (Aug. 1967) *Assistant Professor of Biochemistry*
 GORDON C. G. THOMAS, M.D. (Dec. 1968) *Clinical Assistant Professor of Psychiatry*
 HILAIRE D. THOMAS (1970) *Adjunct Instructor in Medical Technology*
 MARY ELIZABETH THOMPSON, M.A. (1958) *Lecturer in Nursing*
 HARRY J. THOMPSON, M.S. (1971) *Adjunct Associate Professor of Education*
 RUTH EMILY THOMSON, M.S. (1969) *Assistant Professor of Social Work, Psychiatry*
 *PETER THURNAUER, Ph.D. (1966) *Assistant Professor of Physics*
 WILLIAM S. TIHEN, M.D. (1971) *Assistant Professor of Pathology*
 THOMAS R. TIRNEY, Ph.D. (1971) *Assistant Professor of Economics and Business Administration*
 WILLIAM ALLAN TISDALE, M.D. (Aug. 1965) *Professor of Medicine*
 JAMES MARTIN TODD, Ph.D. (1969) *Clinical Assistant Professor of Psychiatry*
 HELENE WALLACE TOOLAN, (Mrs. J. M.) Ph.D. (1964) *Associate Professor of Pathology*
 JAMES MICHAEL TOOLAN, M.D. (1964) *Clinical Assistant Professor of Psychiatry*
 DAVID M. TORMEY, M.D. (Aug. 1968) *Associate Professor of Community Medicine*
 THOMAS DERMOTT TRAINER, M.D. (1960) *Associate Professor of Pathology*
 KARL TREIAL, M.D. (1968) *Clinical Instructor in Psychiatry*
 *RAYMOND HERMAN TREMBLAY, Ph.D. (1953) *Professor of Resource Economics*
 *JACK TREVITHICK, Ph.D. (1946) *Professor of English*
 BENOIT P. TROTIER, D.D.S. (1970) *Instructor in Dental Hygiene*
 KEITH FRANK TRUAX, M.D. (1932) *Clinical Associate Professor of Surgery*
 *MARSHALL MACDONALD TRUE, Ph.D. (1966) *Assistant Professor of History*
 JOHN Y. TRUMPER, M.D. (1970) *Clinical Instructor in Pediatrics*
 CHARLES FREDERICK TSCHOPP, M.D. (Aug. 1968) *Associate Professor of Otolaryngology*
 HENRY M. TUFO, M.D. (1970) *Associate Professor of Medicine*
 ARTHUR FREDERICK TUTHILL, M.S. (1943) *Professor of Mechanical Engineering*
 JOHN CUSHMAN TWITCHELL, M.D. (1961) *Assistant Professor of Medicine*
 *LOUIS MALDONADO UGALDE, Ph.D. (1962) *Associate Professor of Romance Languages*
 HELENA A. URE, M.S. (1968) *Assistant Professor of Nursing*
 NAMIK K. UZSOY, M.D. (1971) *Clinical Instructor in Medicine*
 H. CARMER VAN BUREN, M.D. (1962) *Associate Professor of Medicine*
 FREDERICK WILLIAM VAN BUSKIRK, M.D. (1946) *Professor of Radiology*
 KENNETH EVERSON VARNEY, M.S. (1946) *Assistant Professor of Plant and Soil Science*
 *HUBERT WALTER VOGELMANN, Ph.D. (1955) *Professor of Botany*
 *BRANIMIR F. von TURKOVICH, Ph.D. (1971) *Professor of Mechanical Engineering*
 JAMES R. WADSWORTH, V.M.D. (1951) *Adjunct Associate Professor of Animal Pathology*
 *WILLIAM PHILIP WAGNER, Ph.D. (1966) *Associate Professor of Geology*
 LOUIS J. WAINER, M.D. (1969) *Clinical Instructor in Medicine*
 DAVID HAWKES WAITE, M.A. (1969) *Instructor in Communication and Theatre*
 NELSON LEE WALBRIDGE, Ph.D. (1924) *Professor of Physics*
 H. ALAN WALKER, M.D. (Jan. 1969) *Clinical Instructor in Medicine*

- MARGARET BRANNAN WALKER, (1968-69; Jan. 1970) *Instructor in Art*
 JULIAN ARNOLD WALLER, M.D. (1968) *Professor of Community Medicine*
 LESTER JULIAN WALLMAN, M.D. (1948) *Professor of Neurosurgery*
 MAURICE JAMES WALSH, M.D. (Jan. 1968) *Clinical Instructor in Community Medicine*
- RICHARD RALPH WARNER, Ph.D. (1967) *Assistant Professor of Political Science*
 FRANK J. WATSON, M.A. (1971) *Instructor in Education*
 ROBERT JAMES WATSON, D.M.D. (March 1968) *Instructor in Dental Hygiene*
 LELON ASHLEY WEAVER, JR., Ph.D. (1962) *Assistant Professor of Psychiatry*
 *GEORGE DAYTON WEBB, Ph.D. (June 1966) *Associate Professor of Physiology and Biophysics*
- *FRED CLARENCE WEBSTER, Ph.D. (1951-53; 1956) *Professor of Resource Economics*
 SELINA WILLIAMS WEBSTER, (Mrs. T. M.) M.S. (1948-51; Feb. 1960) *Associate Professor, Clothing and Textiles*
- TRUMAN MARION WEBSTER, Ph.D. (1945) *Professor of German*
 LAURA WEED, M.D. (1969) *Assistant Professor of Medicine*
 LAWRENCE L. WEED, M.D. (1969) *Professor of Medicine*
 THOMAS ALLEN WEIDMAN, Ph.D. (1969) *Assistant Professor of Anatomy*
 *JOHN GEORGE WEIGER, Ph.D. (1958-62; 1964) *Associate Professor of Romance Languages*
- SHELDON WEINER, M.D. (1970) *Assistant Professor of Psychiatry*
 FRANCIS ALEXANDER WEINRICH, M.A. (1950) *Assistant Professor of Music*
 *JAMES GRAHAM WELCH, Ph.D. (Jan. 1968) *Professor of Animal Sciences*
 *DAVID LLOYD WELLER, Ph.D. (Oct. 1967) *Associate Professor of Agricultural Biochemistry*
- *JOSEPH WELLS, Ph.D. (1968) *Associate Professor of Anatomy*
 GEORGE WILLIAM WELSH, M.D. (Jan. 1956) *Associate Professor of Medicine*
 *EUGEN EMMANUEL WELTIN, Dr.sc.nat. (1966) *Assistant Professor of Chemistry*
 EMMA FRANCA WENNBERG, (Mrs. J. E.) M.D. (1967) *Assistant Professor of Anatomy*
 JOHN EGMONT WENNBERG, M.D. (1967) *Associate Clinical Professor of Medicine*
 ALAN PHILIP WERTHEIMER, Ph.D. (1968) *Assistant Professor of Political Science*
- PIETER WESSELING, Ph.D. (1967) *Assistant Professor of Romance Languages*
 ROBERT G. WESTPHAL, M.D. (1971) *Assistant Professor of Medicine*
 *ALAN HAROLD WHEELER, Ph.D. (1969) *Associate Professor of Education*
 WENDELL JENNISON WHITCHER, Ph.D. (1952) *Associate Professor of Chemistry*
 JAMES FELLOWS WHITE, Ph.D. (1955) *Professor of German*
 *WILLIAM NORTH WHITE, Ph.D. (1963) *Professor of Chemistry*
 SUSAN MARION WHITEBOOK, Ph.D. (1969) *Assistant Professor of Romance Languages*
- *DAVID WHITEHORN, Ph.D. (1970) *Assistant Professor of Physiology*
 *ROY ALVIN WHITMORE, JR., M.F. (1958) *Associate Professor of Forestry*
 MARGARET BEACH WHITTLESEY, M.S.W. (1964) *Assistant Professor of Social Welfare*
- ELBERT BENJAMIN WHORTON, JR., Ph.D. (June 1968) *Associate Professor of Community Medicine and Assistant Professor of Mathematics*
- *SAMUEL CLAUDE WIGGANS, Ph.D. (Feb. 1963) *Professor of Plant and Soil Science*
 *CLYDE R. WIGNESS, D.M.A. (1970) *Assistant Professor of Music*
 NANCY M. WILBUR, B.A. (1969) *Adjunct Instructor in Medical Technology*
 JEANETTE T. WILCOX, B.S. (1969) *Instructor in Dental Hygiene*
 KAREN FERN WILEY, M.A. (1969) *Instructor in Romance Languages*
 *JAMES MATTHEW WILLARD, Ph.D. (1969) *Assistant Professor of Biochemistry*
 BARBARA A. WILLIAMS, M.A. (1971) *Instructor in Mathematics*
 BLAIR WILLIAMS, M.S. (1946-48; 1949) *Professor of Home Economics*
 *RONALD W. WILLIAMS, Ph.D. (1970) *Assistant Professor of Electrical Engineering*
 CLODIUS WILLIS, Ph.D. (1969) *Assistant Professor of Romance Languages*
 LEWIS R. WILLMUTH, M.D. (1970) *Assistant Professor of Psychiatry*
 HAROLD G. WILM, Ph.D. (1971) *Professor of Forestry*
 *DAVID M. WILSON, Ph.D. (1969) *Assistant Professor of Botany*
 *MARY SWEIG WILSON, Ph.D. (1969) *Assistant Professor of Communication and Theatre*
- CALVIN H. WILVERT, Ph.D. (1970) *Assistant Professor of Geography*
 CHRIS G. WOELFEL, Ph.D. (1968) *Adjunct Associate Professor of Animal Sciences*
 GEORGE A. WOLF, JR., M.D. (1970) *Professor in Medicine*
 ARTHUR D. WOLK, M.D. (1970) *Clinical Instructor in Pediatrics*
 GLEN MEREDITH WOOD, Ph.D. (1950) *Associate Professor of Plant and Soil Science*

NORMA LOWYN WOODRUFF, Ed.D. (1952)	Professor of Nursing
RICHARD S. WOODRUFF, M.D. (1950)	Assistant Professor of Pathology
WILLIAM ALOYSIUS WOODRUFF, M.B. (1962)	Associate Professor of Psychiatry
CHARLES A. WOODS, Ph.D. (1971)	Assistant Professor of Zoology
*ROBERT CUMMINGS WOODWORTH, Ph.D. (1961)	Associate Professor of Biochemistry
A. PETER WOOLFSON, Ph.D. (1970)	Assistant Professor of Sociology
JOHN K. WORDEN, Ph.D. (1970)	Instructor in Communication and Theatre
IAN A. WORLEY, M.S. (1970)	Assistant Professor of Botany
ALICE L. WRIGHT, M.D. (1971)	Assistant Professor of Psychiatry
*ROBERT KINGMAN WRIGHT, Ph.D. (1966)	Associate Professor of Mathematics
*CLAUS ADOLF WULFF, Ph.D. (1965)	Associate Professor of Chemistry
ALBERT WILHELM WURTHMANN, M.A. (Jan. 1947)	Assistant Professor of German
*ROY EDWARD WUTHIER, Ph.D. (1969)	Assistant Professor of Biochemistry and Clinical Associate Professor of Orthopaedic Surgery
MARY F. WYNNE, B.S. (1971)	Adjunct Assistant Professor of Home Economics
*DHARAM PAUL YADAV, Ph.D. (Jan. 1970)	Assistant Professor of Communication and Theatre
STANLEY O. YARIAN, Ph.D. (1970)	Assistant Professor of Philosophy and Religion
BRIAN J. YOUNG, M.A. (1970)	Instructor in History
*WILLIAM JOHNSON YOUNG, II, Ph.D. (May 1968)	Professor of Anatomy
ARMANDO E. ZARATE, Ph.D. (1970)	Assistant Professor of Romance Languages
LEONARD M. ZUBKO, M.M.E. (1970)	Adjunct Professor of Mechanical Engineering

Associates in Instruction and Research

ROSEMARY C. BREWSTER, M.D.	Clinical Associate in Psychiatry
HARRY LIVINGSTON COLOMBO, M.D.	Clinical Associate in Medicine
WILLIAM HENRY HEININGER, M.D.	Clinical Associate in Medicine
HERMAN CONRAD HERRLICH, Ph.D.	Research Associate in Experimental Medicine
PATRICIA KATHERINE HICKCOX, B.A.	Research Associate in Regional Medical Program
M. STEPHEN HUNTLEY, Ph.D.	Research Associate in Psychology
SHIGEMASA IKEDA, M.D.	Research Associate and Clinical Associate in Anesthesiology
YOSHINORI ISHIKAWA, D.Ag.Sci.	Research Associate in Biochemistry
RICHARD HARRY JAGELS, Ph.D.	Research Associate in Botany
FREDERICK M. LAING, M.S. (1953)	Research Associate in Botany
GEORGE LUCCHINA, M.D.	Research Associate in Physiology
JOAN MOEHRING, Ph.D.	Research Associate in Medicine
JAMES A. ROONEY, Ph.D. (1965)	Research Associate in Physics
JOHN LOUIS SAIA, M.D.	Clinical Associate in Medicine
JAN R. SCHULTZ, M.S.	Research Associate in Medicine
MAURICE JAMES WALSH, M.D.	Clinical Associate in Medicine

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EDWIN BARTLETT ABBOTT (1921)	Auditor Emeritus
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STEPHEN P. ADAMS, B.A. (1967)	Administrative Associate, Department of Medicine
JOHN W. ALDEN, M.A. (1971)	Director of Institutional Studies
RICHARD WALKER AMIDON, M.D. (1950)	Medical Director, University Health Services
SARA WALTON ANDREWS, M.S.L.S. (1969)	Head of Catalog Dept. Dana Medical Library
JAMES B. ANTELL (1970)	Director of Development, Division of Health Sciences
HAROLD C. AVERY, JR., B.S. (March 1967)	Associate Accountant, Sponsored Projects
DAVID BABBOTT, M.D. (Aug. 1967)	Assistant Dean, College of Medicine
HERBERT A. BAHRENBURG, B.Ch.E. (1969)	Director of Physical Plant
WILLIAM P. BALLARD, B.S. (1969)	Director of Off-Campus Housing
DAVID BARD, M.Ed. (1971)	Teaching Associate, Teacher Education Program
RICHARD OTTO BARWIN, M.A. (1968)	Registrar
NORMAN C. BASLOW (Jan. 1970)	Superintendent, Project Construction
THOMAS DAY SEYMOUR BASSETT, Ph.D. (1958)	Curator, Wilbur Collection and University Archivist
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ALICE L. WRIGHT, B.S. (1969)	<i>Assistant Nutritionist</i>

ENGINEERING

WARREN ORVEL ESSLER, Ph.D.	<i>Director and Electrical Engineer</i>
REGINALD VENN MILBANK, M.S.	<i>Civil Engineer</i>
JOHN OGDEN OUTWATER, Sc.D.	<i>Mechanical Engineer</i>

RELATED SERVICES STAFF

The Related Services Division renders various services in the fields of agriculture and home economics, such as inspection of feed, seeds, and fertilizer; analysis of soils, milk, and other agricultural products on request; diagnosis of diseases of plants, poultry and other livestock, and analyses for the Vermont Parimutual Racing Commission.

Extension Service Staff

The Cooperative Extension Service is a cooperative undertaking of the State of Vermont, the College of Agriculture and Home Economics, the United States Department of Agriculture, and the several counties of the State. It has a State staff, with headquarters at the University, and a staff of county extension agents in the University Extension Service Centers in each county. Its purpose is "to aid in diffusing among the people . . . useful and practical information on subjects relating to agriculture, home economics, resource development, community development and related subjects, and to encourage the application of the same." It also brings general University educational information to the people of the State. Its programs are available to all the people of the State, including both adults and youth.

THOMAS WHITFIELD DOWE, Ph.D.	<i>Dean and Director</i>
WESSON DUDLEY BOLTON, D.V.M.	<i>Animal Pathologist</i>
HOLLIS EARL BUCKLAND, B.S.	<i>Seed Analyst</i>
KENNETH STEWART GIBSON, M.S.	<i>Dairyman</i>
ROGER WALTER MURRAY, D.V.M.	<i>Associate Animal Pathologist</i>
KAY MILLIGAN NILSON, Ph.D.	<i>Associate in Dairy Manufacturing</i>
HARRY LEONARD SAWYER, JR., B.S.	<i>Associate Chemist</i>
JAMES ROGER WADSWORTH, V.M.D.	<i>Animal Pathologist</i>
ROBERT THOMAS WETHERBEE, M.S.	<i>Chemist</i>

THOMAS WHITFIELD DOWE, Ph.D.	Dean
ROBERT POWERS DAVISON, M.Ed.	Director
HENRY VERNON ATHERTON, Ph.D.	Dairy Bacteriologist
DONALD JAMES BALCH, Ph.D.	Animal Scientist
MALCOLM IRVING BEVINS, M.S.	Agricultural Economist
CHARLES WHITNEY BIGALOW, M.S.	Extension Economist
WILLIAM H. BINGHAM, M.S.	Area Resource Development Specialist
WESSON DUDLEY BOLTON, D.V.M.	Animal Pathologist
CHARLES LYMAN CALAHAN, M.S.	Horticulturist
MARY C. CARLSON, B.A. (1968)	Program Assistant
F. ALINE COFFEY, B.S.	Nutritionist
ROBERT W. DUMVILLE, B.A. (1969)	R.C.D.A. Resource Specialist
DWIGHT KIMBALL EDDY, M.E.Ed.	Agricultural Economist
JAMES ALBERT EDGERTON, M.Ext.Ed.	Area Resource Development Specialist
NORRIS ARTHUR ELLIOTT, B.S.	Area Community Affairs Specialist
THEODORE ROSS FLANAGAN, Ph.D.	Assistant Agronomist
PATRICIA A. FLYNN, B.A.	Urban Youth Specialist
RAYMOND THOMAS FOULDS, JR., M.F.	Forester
KENNETH STEWART GIBSON, M.S.	Dairyman
MONTE R. HAROLD, M.W.T. (1970)	Marketing and Utilization Specialist
VERLE RANDALL HOUGHABOOM, Ph.D.	Agricultural Economist, and Environmental Programs Coordinator
ESTHER L. KNOWLES, M.S.	Housing Specialist
KARIN KRISTIANSSON, M.A.	Associate Editor
WILLIAM PATRICK LEAMY, M.S.	Dairyman, DHIA
JOHN JOSEPH LINDSAY, Ph.D.	Outdoor Recreation Specialist
GEORGE BUTTERICK MacCOLLOM, Ph.D.	Entomologist
JANE S. MacKECHNIE, B.A. (1971)	Urban Youth Specialist
THOMAS JAMES McCORMICK, M.E.Ed.	Associate Editor
PATRICIA ANNE MALONE, B.S.	Assistant Editor
JOHN DOTY MERCHANT, M.E.Ed.	Supervisor and Program Leader (Youth Work)
LEONARD SMITH MERCIA, M.S.	Poultryman
MILO J. MOORE, M.S.	Housing and Utilities Engineer Specialist
GORDON ROY NIELSEN, Ph.D.	Entomologist
NORMAN EUGENE PELLETT, Ph.D.	Ornamental Horticulturist
MONICA B. PORTER, B.A.	Director, Windsor Low Income Center
FAITH KENYON PRIOR, M.S.	Home Management Specialist
M. PAULINE ROWE, M.E.	Supervisor and Program Leader (Youth Work)
FREDERICK OBERLIN SARGENT, Ph.D.	Resource Economist
SUSAN B. SOULE, B.S. (1970)	Assistant Nutritionist
JOHN WALLACE SPAVEN, B.S.	Editor
DORIS HOSMER STEELE, M.A.	Supervisor and Program Leader (Home Economics)
WILLIAM WILLARD STONE, M.A.	Supervisor and Program Leader and Rural Development Specialist
BARENT W. STRYKER, III, M.S.	Area Resource Development Specialist
KATHLEEN LEBARON STRASSBURG, M.A.T.	Clothing Specialist
ANDREW TESSMANN, B.S.	Agricultural Engineer
NOAH THOMPSON, M.E.Ed.	Area Resource Development Specialist
ENOCH HAROLD TOMPKINS, M.S.	Rural Sociologist
WILLIAM VERNON TUXBURY, B.S.	Assistant to Director
TINA M. VALENTINETTI, B.S. (1971)	Health Education Specialist
JAMES ROGER WADSWORTH, V.M.D.	Animal Pathologist
WINSTON ARTHUR WAY, M.S.	Agronomist
KATHLEEN BEAVINGTON WEBB, B.S.	Associate Editor
FRED CLARENCE WEBSTER, Ph.D.	Agricultural Economist, Marketing
DAVID M. WILSON, Ph.D.	Plant Pathologist
CHRIS G. WOELFEL, Ph.D.	Dairyman
ALICE M. WRIGHT, B.S.	Assistant Nutritionist

County Extension Agents

Addison County

LUCIEN DEMERS PAQUETTE, M.E.Ed.
JOHN FRANKLIN STEPHENSON, M.E.Ed.

Middlebury
Middlebury

MRS. LEONA WARREN THOMPSON, B.S. BERNARD MAURICE NADEAU, B.S.	Middlebury Middlebury
<i>Bennington County</i> EILEEN M. BROGAN, B.S. JOHN CALVIN PAGE, M.S. WILLIAM SNOW, B.S.	Bennington Bennington Bennington
<i>Caledonia County</i> PHILIP KAIR GRIME, M.E.Ed. MRS. ALICE JOHNSON BLAIR, B.S. LINDSAY THOMAS TOWNSEND, B.S.	St. Johnsbury St. Johnsbury St. Johnsbury
<i>Chittenden County</i> ROBERT LACKIE CARLSON, B.S. LOUELLEN WASSON, B.S. MRS. BETTY T. ANDREWS, B.S.	Essex Junction Essex Junction Essex Junction
<i>Essex County</i> S. ELLEN BARBEE, B.S. TIMOTHY M. WHITE, B.S.	Guildhall Guildhall
<i>Franklin County</i> ERDEN WELLS BAILEY, B.S. G. PATRICIA COOK, B.A. DONALD JAMES McFEETERS, M.S. MARILYN S. WADE, B.S.	St. Albans St. Albans St. Albans St. Albans
<i>Grand Isle County</i> ROBERT ELLIS WHITE, B.S.	North Hero
<i>Lamoille County</i> BEATRICE F. BUXTON, M.S. SILAS HAMILTON JEWETT, B.S. ELIZABETH M. SOMERS, B.S.	Morrisville Morrisville Morrisville
<i>Orange County</i> GORDON VOLNEY FARR, B.S. MRS. SHIRLEY HALL CUSHING, B.S. MRS. JUDITH CLARK, B.A.	Chelsea Chelsea Chelsea
<i>Orleans County</i> ROGER DAVIS WHITCOMB, B.S. JOHN ROBERT PRICE, B.S. MRS. MARION McIVER BUCKLAND, B.S. WILLIAM TARBELL ZELLER, B.S.	Newport Newport Newport Newport
<i>Rutland County</i> WILLIAM MICHAEL COREY, M.S. DAVID PAUL NEWTON, M.S. MRS. BETHIA NOBLE MUNGER, B.S. CHESLEY PECK HORTON, M.Ed.	Rutland Rutland Rutland Rutland
<i>Washington County</i> EDWARD L. BOUTON, B.S. MRS. HAZEL C. BROWN, M.S. DONALD ROBERT WHAPLES, M.S.	Montpelier Montpelier Montpelier
<i>Windham County</i> NANCY T. LENT, B.S. RAYMOND IRVING PESTLE, JR., M.S. MRS. RUTH DENSMORE HERTZBERG, B.S. HOWARD HARRY SMITH, B.S.	Brattleboro Brattleboro Brattleboro Brattleboro
<i>Windsor County</i> JOYCE WILLIAM SUMNER, B.S. MRS. DOROTHY FLORENCE BENT, M.A.T. EDWARD WALTER GOODHOUSE, B.S.	Woodstock Woodstock Woodstock

V Introduction

Webster defines a university as an educational institution of the highest level, typically with one or more undergraduate schools or colleges, together with a program of graduate studies and a number of professional schools, and authorized to confer various degrees, as the bachelor's, master's, and doctor's. A university is that and more—it is a community of scholars, skilled and seeking knowledge and understanding in a wide range of specialized fields, holding and seeking degrees in those fields; sharing a common campus and classrooms, laboratories, library, and other resources which support and make it possible for students and teachers to work together in pursuit of mutual and individual interests.

Today, more than ever, a university offers for the prospective student an opportunity to live and work in a community where he or she may find or make a place to suit his or her needs, and to achieve satisfaction and success commensurate with individual application.

It is still possible today, as probably it has always been, to achieve a degree without truly achieving an education and, regrettably, it is still true today that colleges and universities cannot always motivate each student to achieve his full potential or to find in formal education answers to the problems of his or her life.

But a university offers the student perhaps the broadest opportunity available in our free society to explore and advance his or her understanding of our heritage and the means which knowledge and understanding afford us of preserving and advancing what is best of our society.

The University of Vermont is the state and land-grant university of Vermont, one of a handful of U.S. institutions of higher education founded in the eighteenth century, the 20th oldest U.S. institution of higher learning authorized to grant degrees and the second founded by state legislative action to offer instruction at the university level.

It is a relatively small university—with approximately 7,500 students in its undergraduate, graduate and medical programs. It offers a wide range of opportunities (over 150 programs leading to 31 degrees) for students to elect to specialize through the College of Arts and Sciences, the College of Agriculture and Home Economics, the College of Education, the College of Technology, and the Division of Health Sciences

with its College of Medicine, School of Allied Health Sciences, and the School of Nursing. Advanced degree programs are offered through the University's Graduate College. Summer and evening programs provide additional study opportunities through the Division of Continuing Education.

The University is located at Burlington, Vermont, with the Green Mountains on the east and Lake Champlain and the Adirondacks to the west.

Burlington, the largest city in the State, with a population of 40,000, is 95 miles from Montreal, 230 miles from Boston, and 300 miles from New York City. The city has daily plane and bus service to these points.

The University of Vermont is a research, as well as a teaching center, and undergraduate as well as graduate and medical students have opportunities to participate in a varied program of research activity. Currently about 500 research projects supported by more than \$5,000,000 in grants from interested federal, state and private agencies are being carried out in such fields as cancer and heart research, muscular dystrophy, pollution, drug use, highway safety, color X-rays, ultrasound, thermal stress, origins of the cold war, ancient ethics and economic theory, leaf growth, microbial ecology of Lake Champlain and—perhaps a good place to stop—brain currents.

As the modern university emerges as an institution whose full resources serve a widening constituency, so are the education, research and service resources of the University of Vermont increasingly focused toward involvement with current and major problems and needs of our society. As a state and land-grant institution, the University of Vermont enjoys this role as a matter of tradition, and its faculty, staff and students are engaged in a wide range of programs which touch or affect the lives of citizens within the state and beyond its borders. Students and faculty have shown a growing interest in the need to foster and encourage a more meaningful dialogue both on and beyond the campus boundaries.

Regional Cooperation

The University of Vermont is an active participant with the Universities of Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island; and with Lowell Technological Institute, and the public two-year colleges and technical institutes in a program of regional cooperation aimed at increasing educational opportunities for qualified young men and women of the New England states. Under the program New England residents are given admissions preference and resident tuition privileges in certain specialized curricula. A special

brochure detailing these specialized curricula, has been prepared by the New England Board of Higher Education and is available through the Board, 20 Walnut Street, Wellesley, Mass. 02181, the University of Vermont admissions office, and from the other New England participants.

The University of Vermont offers the following programs in which the Vermont in-state tuition rate is available for students from the states named.

REGIONAL PROGRAMS

OFFERED BY VERMONT	TO					STUDENTS FROM				
	Conn.	Me.	Mass.	N.H.	R.I.					
Agricultural Technology		x		x						
Biochemistry										x
Canadian Area Studies	x	x	x	x						x
Classics		x								x
Dairy Technology		x		x						x
Dental Hygiene*	x	x	x	x						
Radiologic Technology*	x	x	x	x						x
Latin										x
Management Engineering	x	x		x						
Medical Laboratory Technicians*	x	x	x	x						
Physical Therapy		x	x	x						x
Recreation		x								x
Social Service	x	x	x							x
Speech and Hearing Therapy										x
Wildlife Management										x

* Two-year program

The University Libraries

The main Library, dedicated in 1961, is named to honor the late Guy W. Bailey, thirteenth president of the University. It holds the largest book collection in Vermont, and acquires regularly the major periodicals, scholarly journals and indexing and abstracting services. The University collections also include books in medicine and health-related sciences, and a strong collection in medical periodical literature, maintained in the Dana Medical Library of the Division of Health Sciences.

The Bailey Library is a depository for United States and Canadian government publications, and acquires newspapers, pamphlets, maps, and materials in microfilm. The Special Collections Department includes books and manuscripts from the library of George P. Marsh, a significant Masfield poetry collection, and its Wilbur Collection is rich in books and manuscripts of those associated with the State, including Ira Allen, Henry Stevens and Dorothy Canfield.

The Physics and Chemistry Library is located in the Clinton D. Cook Physical Sciences building.

The Robert Hull Fleming Museum

The Museum houses the University collection of art and archaeology. Through its displays, special exhibits, lectures, films and other activities, it has served the cultural life and educational needs of the campus and the people of Vermont since first established as the Park Gallery in 1873. Selections from a collection of some 6000 items covering the history of art are arranged to enrich teaching in various fields, particular galleries given to Ancient, Oriental, Tribal, American and European art. Two galleries are set aside for changing exhibitions that augment the collection, focusing on contemporary, often Vermont, contributions to art, architecture and the crafts.

The Museum also offers a program of lectures, gallery talks and discussions, of films, guide services for schools and interested groups, and, in collaboration with Art Education, classes for children.

The Museum Association, open to the public, is composed of friends whose support makes possible the continued growth of collection and activities.

The Museum houses the Art Department collection of 25,000 slides and photographs, as well as a reference library and study center for Art History. The lower level incorporates an intimate theater seating 300 in arena style, that features University Dramatics during the academic year and the annual Shakespeare Festival in the summer.

The George Bishop Lane Artists Series

The George Bishop Lane Artists Series is one of the major collegiate artists series in the country, inaugurated in 1955 by a gift from the late Mrs. Lane, in honor of her husband, George Bishop Lane of the Class of 1883.

The Lane Series brings to the campus and community a continuing program of musical, theatrical, dance and other artistic productions.

The Series is planned and produced by a student-faculty committee, with townspeople serving with student and faculty members on an advisory committee.

The Lane Series has presented many of the world's finest artists, including the London Philharmonia, the Vienna Philharmonic, the Philadelphia Orchestra, the Cleveland Orchestra, the Chicago Symphony Orchestra, the Moscow Philharmonic Orchestra with David Oistrakh, the Royal Ballet of London, the American Ballet

Theatre, Rudolf Serkin, Artur Rubinstein, Van Cliburn, Isaac Stern, Nathan Milstein, Andres Segovia, The Vienna Choir Boys, the Weav-Theatre, Rudolf Serkin, Artur Rubinstein, Van Cliburn, Isaac Stern, Nathan Milstein, Andres Segovia, The Vienna Choir Bous, the Weavers, the Robert Shaw Chorale, the Budapest String Quartet, Dave Brubeck, Errol Garner, Benny Goodman, Victor Borge, Al Hirt, Mantovani, Harry Belafonte, Joan Baez, Maurice Chevalier, Bill Cosby, Ella Fitzgerald, Henry Mancini, Sir John Gielgud, Roberta Peters, the New York City Opera Company, the Metropolitan National Opera Company, the D'Oyly Carte Opera Company, and a number of plays including *Tea and Sympathy*, *Li'l Abner*, *Camelot*, *Man for All Seasons*, *Look Homeward, Angel*, *J. B.*, *Hello, Dolly!*, *Hair*, and *Jesus Christ Superstar*.

In addition to three major series presented during each academic year, the Lane Series also sponsors a Chamber Arts Series in the spring semester, the Lane Summer Series, several youth concerts and special events, film series, and extension series in St. Johnsbury and Springfield.

Conferences and Institutes

An increasing number of groups hold educational conferences, institutes and seminars on the campus of the University, which is pleased to cooperate in making its facilities available for this purpose whenever it is possible to do so. Charges are made to cover costs to the University.

Further information may be obtained through the Office of Conferences and Institutes.

Educational Television

Vermont Educational Television is a state-wide network serving the schools and general public of the State of Vermont, and is owned and operated by the University of Vermont. The UHF television facility transmits in-school programming for grades 1 through 12 each week day. Evening programming includes network and locally-produced programs of both entertainment and instructional variety. In-service programs for specific vocational interests are aired, and courses are given for credit through the Evening Division of the University of Vermont.

Vermont Educational Television has received several national awards for locally produced programs.

Programs are broadcast over WETK-TV, Channel 33, Burlington; WVTB, channel 20, St. Johnsbury; WVER, channel 28, Rutland; and WVTM, channel 41, Windsor; and on channels 74, 76, 79 at Manchester, Wilmington, and Bennington.

Student Life

The general welfare of students is the responsibility of the Office of the Dean of Students.

Student Personnel Services

Student Personnel Services are available to assist students in the development of individual or group goals. These services include the offices of Student Personnel Deans, Director of Intercollegiate Activities, Director of Testing and Counseling, Director of Admissions, Director of Financial Aid, Director of Placement, Director of University Health Services, Advisor to Foreign Students and Scholars, Director of Housing, and the Director of Student Activities.

Extensive resources applicable to group goals, purposes and organizational problems are offered through consultation with these offices. The student personnel staff is trained to work with individuals and groups in an effort to obtain optimum educational objectives and experiences.

COUNSELING AND TESTING CENTER The Counseling and Testing Center has been established to aid students toward becoming maximally effective as students and as persons. To help each student benefit from his university career and develop to the full limit of his potentialities, professional psychological services are provided for a wide range of problems—educational, vocational, and personal. The Center offers individual counseling and testing on a confidential basis to all matriculating students. Referral to other appropriate specialities such as Psychiatric Services, Reading Center, and Placement Office is also available.

PLACEMENT SERVICE To assist graduating Seniors and Alumni in exploring and selecting among various employment possibilities, the University operates a Placement Program. Representatives from business organizations, governmental agencies, and school systems come to the campus each year to interview for full-time positions. Related services include individual career planning and the

preparation of confidential credentials. For undergraduates, occupational information is available in the Placement Office and career planning lectures are given during the semester. This office also assists students in obtaining part-time employment.

FINANCIAL AID The University Financial Aid office counsels students on financial problems and administers the University's Scholarship and Loan Funds.

VETERANS ADMINISTRATION BENEFITS Students who are eligible to receive educational benefits from the Veterans Administration under the provisions of Public Laws 634 (veteran's child), 894 (disabled veteran), or 89-358 (veteran who served on active duty with the Armed Forces after January 31, 1955) should present a "Certificate for a Program of Education" or a "Certificate of Eligibility" to the Office of The Registrar at the time of registration. If the student is presently in training at another institution, he should complete a "Request for Change of School" form which may be obtained from his regional V.A. office. Questions regarding Veterans Administration benefits should be directed to the Office of The Registrar.

READING CENTER The University Reading Center, located in the Waterman Building, provides a free program for students who wish to improve their reading, vocabulary, and study techniques. Some tutorial services are also available. The first semester classes are open primarily to freshmen whose college entrance examinations indicate such a need. However, other students who are in need of improvement are urged to enroll in the reading program. Students who enroll are expected to attend regularly throughout the semester.

SPEECH AND HEARING CENTER Services of the Speech and Hearing Center, located in Pomeroy Hall are free to students in the University who have problems of speech, language, voice, and hearing; for example, problems of articulation, dialect, stuttering, inefficient voice production, hearing loss, and those problems associated with such conditions as cleft palate and cerebral palsy.

University Health Services

The University community has complete resources for maintaining the physical well-being of members of the student body. The Health Service, with its headquarters at the Wasson Memorial Infirmary, provides medical, minor surgical, orthopedic and short-term psychiatric care for all students. Major medical, surgical, orthopedic and psychi-

atric cases will be treated at the Medical Center Hospital of Vermont at the student's expense. When feasible, arrangements may be made for such care at a hospital nearer the student's home. Long-term psychiatric cases will be treated by a local psychiatrist outside the Health Services at the student's expense. Athletic teams are examined prior to activity and care of injuries in these sports is supervised by the Health Service.

The Health Service is staffed by a Director, associate physicians, and psychiatric, gynecological, and orthopedic consultants.

The infirmary is staffed by an administrative director, full staff of registered nurses, a part-time laboratory technician, and physical therapists who are also the athletic trainers. The infirmary is never closed. One of the staff physicians is on call at all times in addition to the scheduled office hours. A student may employ a private physician at his own expense and use the infirmary facilities.

With the student's permission, parents are notified by phone or letter of illness or injury.

Every student who pays the Health Service fee is entitled to a maximum of five days of infirmary care and such routine medical care as is needed and as the infirmary and health service can render during the academic year. Students who require infirmary care for more than five days in the college year are charged at the rate of \$12.00 per day.

Medical excuses from required physical education courses must be cleared through the University Health Service.

Housing

The University provides housing for all full-time undergraduate students except for commuting students and those who desire and are eligible to live off campus. Upper class students who are actives or pledges of a fraternity or a sorority may register for University residence hall housing or chapter housing. Men and women students who have completed two full semesters as of June 15 of the current year or also those who reach the age of 21 years as of December 31 of the current year may register for University residence hall housing or off-campus housing. The University is not responsible for the approval of off-campus housing facilities.

A. Residence Halls. All undergraduate men and all unmarried undergraduate women are eligible to live in University residence halls. Contracts for room and board are binding for the college year unless cancelled for due cause with the sanction of the Office of Residence Halls. In August each new student will receive notification of a housing assignment and the date and hour of the opening of his or her residence hall. Rooms may not be occupied until the date specified. Each

student is expected to leave the residence hall not later than twenty-four hours after his or her last examination at the close of each semester.

Facilities for doing personal laundry are provided in residence areas as well as space for the storage of trunks, baggage and skis. Bed linen and towels may be furnished by the student or rented from a commercial linen service which provides weekly delivery of two sheets, a pillow case, and three towels. Students provide their own window draperies, pillows, metal wastebaskets, bureau covers, desk and reading lamps. All students living in the residence halls must have board contracts in the appropriately assigned dining hall, with the exception of upperclass students who are members of fraternities or sororities who may elect to take their meals in the chapter house.

In order to facilitate maximum educational growth from the residence hall experience each residence hall will house residents from each of the four undergraduate classes. Each residence hall is under the guidance and direction of a Resident Adviser who is a member of the Student Personnel Staff. In addition, the Resident Adviser is assisted by specially selected undergraduate Resident Assistants. These staff members encourage the development of intellectual, social, and cultural programs and assist the residents in their growth toward maturity and responsible self direction. Each student in the residence halls is a member of his residence hall student government organization which represents student opinion and which provides educational and social programs for its constituents.

B. Fraternities and Sororities. Chapters of Greek letter fraternities and sororities have long been recognized as part of the intellectual, social, and extracurricular life on the campus. These groups provide valuable experience for their members in the form of interfraternity athletic competition, interfraternity sings, dances, social work projects, house operations, meal service, and educational programs. Fraternities and sororities are under the jurisdiction of the Student Personnel Dean. Fraternity activities are coordinated by the Interfraternity Council and sorority activities are coordinated by a Panhellenic Council.

C. Married Student Apartments. Located just outside Winooski on Route 15, at historic Fort Ethan Allen, the University's Married Student Apartments are a four-mile drive from the main campus. Built in 1969, the development consists of 89 partially furnished apartments located in eleven two-story buildings. There are 56 garden apartments (42 two-bedroom and 14 one-bedroom) and 33 town house apartments (all two-bedroom). A centrally located service building contains laundry facilities and a multi-purpose community room. Within the complex are three ample parking areas.

Each apartment is furnished with an electric stove, refrigerator and

water heater, kitchen cabinets and shelves, garbage disposal, and wall-to-wall carpeting. Every apartment has a private entrance and mail-boxes are provided. The apartments are heated electrically and each room is individually controlled.

The apartments have achieved nationwide acclaim for their architectural design. Additional units are in the planning stage for expected completion in July 1973.

Detailed rental information may be obtained from the Director of Off-Campus Housing, 600 Dalton Drive, Winooski, Vermont, 05404.

D. Off-Campus Housing. University students eligible to live off-campus may utilize the facilities of the Off-Campus Housing Office in locating suitable housing in the greater Burlington area. This office provides a free listing service by which community landlords and rental agents are able to make known their housing availability to those persons associated with the University.

Students may examine up-to-date listings for available apartments, houses, and rooms for rent and information about houses for sale at the Off-Campus Housing Office or on a bulletin board just off the College Street entrance of Waterman Building on the main campus. The University is not responsible for the approval of off-campus housing facilities. It is impractical to send information concerning individual listings by mail. A catalog of available listings is issued each May, August, and December.

Additional information concerning housing off-campus may be obtained by contacting the Off-Campus Housing Office, 600 Dalton Drive, Winooski, Vermont, 05404.

Student Activities

The University officially recognizes the activities of a number of organizations supplementing the social and recreational needs of students, developing their cultural and religious interests, providing them with valuable business and executive experience, and broadening their contacts. Because it is within this area that qualities of leadership may be developed, the University encourages participation consistent with its scholastic requirements. The students manage the affairs and finances of these organizations within the framework of the University's regulations.

RELIGIOUS LIFE Although the University cannot itself attempt to guide the religious life of its students, this work is carried out by several independent agencies: the B'nai B'rith Hillel Foundation; the Catholic Center; the Council for a Cooperative Ministry (sponsored by the American Baptist, Methodist, and Presbyterian

churches, and the United Church of Christ); and the Episcopal Church at the University of Vermont. In addition, the Inter-Varsity Christian Fellowship, the Christian Science College Organization, and the Church of Jesus Christ of Latter-Day Saints are represented on campus. Students desiring information on any of these groups are referred to the office of the Consultant on Religious Programs.

THE BILLINGS CENTER The major function of this multi-purpose building, located in the former Billings Library, is to provide the "where" for co-curricular activities in an atmosphere consistent with the goals of the University for individual development. Billings provides facilities for lectures and other programs sponsored by the various student organizations; small group conference rooms; study and recreational lounges; and snack bar facilities in the Cata-mountain Den.

As the focal point of many student activities, most campus organization offices are located in Billings. Included are the Director of Student Activities; Student Association; Inter-Residence Association; Panhellenic Council; Interfraternity Council; Student Committee on Discipline; University of Vermont Music and Film Festival; *Cynic*; *Ariel*; and Billings Center Governing Board.

UVM STUDENT ASSOCIATION All students enrolled in the undergraduate colleges and schools are charged a student activity fee and thus become members of the UVM Student Association. A Senate, consisting of elected officers and representatives, holds weekly meetings during the year and conducts the regular business of the association. However, the student body may be convoked by the Senate or by any group of students to hold a referendum or to conduct extraordinary business. There are many opportunities for students to participate in the work of the standing or ad hoc committees.

STUDENT COMMITTEE ON DISCIPLINE The judicial authority of the Student Association is vested in the Supreme Court, which consists of student representatives of each of the undergraduate colleges. The court has jurisdiction in all cases concerning interpretation of the Constitution and By-laws of the Student Association and legislation enacted in pursuance thereof. The Committee hears cases referred to it by the Student Personnel Deans or the Standing Committee on Jurisdiction.

INTER-RESIDENCE ASSOCIATION (IRA) The Inter-Residence Association is a government which represents

the students living in University residence halls. The government, consisting of an executive board, legislative council and judicial board, provides leadership for residence hall students, representing their interests to other constituencies within the University community.

HONORARY SOCIETIES National Honorary Societies represented on the University of Vermont campus include:

The Phi Beta Kappa Society established the Vermont Alpha Chapter at the University in 1848, and initiates are chosen primarily on the basis of high scholastic standing. The local chapter was the first in Phi Beta Kappa to initiate women into membership.

Mortar Board is a national honorary society for senior women. Although membership in Mortar Board comes as a great honor for a University of Vermont woman in recognition of outstanding service, scholarship, and leadership, it is also a challenge for continued sound and honest scholarship, and for unselfish service in the best interests of the college campus.

The Society of the Sigma Xi, established at the University in 1945, initiates those who have proved their ability to do research in one of the sciences including students who have a high scholastic standing.

Other national honorary societies include Alpha Omega Alpha, medicine; Alpha Zeta, agriculture; Kappa Delta Pi, education; Tau Beta Pi, engineering; Omicron Nu, home economics; Delta Sigma Rho-Tau Kappa Alpha, debating; Sigma Phi Alpha, dental hygiene; National Collegiate Players, dramatics; and Alpha Lambda Delta, freshman women's scholastic; Ethan Allen Rifles, outstanding students in the Reserve Officers Training Corps; Pershing Rifles, a military fraternity.

RECOGNITION SOCIETIES The several class societies recognize contributions to the University of Vermont and leadership in campus life. The Boulder Society, a local society for senior men, recognizes responsible student leadership, as does Mortar Board for senior women. Election to these societies is counted one of the highest honors that a University of Vermont man or woman can achieve. Other class recognition societies are Key & Serpent, a junior society, and Gold Key, a sophomore society.

The Staff & Sandal, recognition society for junior class women, and the Sophomore Aides, for women of the sophomore class, recognize leadership and scholastic achievement.

ATHLETICS AND INTRAMURAL PROGRAMS A program of intercollegiate competition for men is maintained in basketball, cross-country, football, golf, hockey, indoor track,

rifle marksmanship, skiing, soccer, swimming, tennis, track. The athletic policies of the University are under the direction of the Athletic Council, composed of members of the faculty, the student body, and alumni. Athletic relations are maintained with colleges and universities in New England and the eastern seaboard. The University is a member of the "Yankee Conference," which is composed of the State Universities in New England, of the National Collegiate Athletic Association, the New England Intercollegiate Athletic Association, and the Eastern College Athletic Conference. The Department of Physical Education for Men offers an excellent program of intramural sports which provides for voluntary participation by men in all classes. Competition in nineteen different sports activities is arranged among fraternities, residence halls, independent groups, and individuals. In addition to regularly scheduled intramural contests, the facilities of Patrick Gymnasium are available at various times during the week for recreational free play in a wide variety of sports activities. Equipment for free play is provided by the University and is available on a loan basis by presentation of the student's ID card.

The Women's Recreation Association, open to all women students, sponsors intramural, extramural, and intercollegiate sports events for women in a variety of team sports, individual, dual, and recreational activities. Through its program, WRA endeavors to provide opportunity for leadership and to encourage participation in and administration of recreational activities and service projects for all women students.

The Outing Club sponsors mountain climbing expeditions, ski trips, and other outdoor activities for both men and women students.

FRATERNITIES AND SORORITIES Chapters of Greek letter fraternities and sororities have long been recognized as part of the intellectual, social, and extracurricular life on the campus. These groups provide valuable experience for their members in the form of interfraternity athletic competition, interfraternity sings, dances, social work projects, house operation, and meal service. Fraternities and sororities are under the jurisdiction of the Student Personnel Deans. Policies regarding the establishment of new chapters and the operation of present groups on the campus are subject to the authority of the University Council. Fraternity activities are coordinated by the Interfraternity Council and sorority activities are coordinated by a Panhellenic Council. The following are active chapters of national and local fraternities: Acacia, Alpha Epsilon Pi, Alpha Gamma Rho, Alpha Tau Omega, Delta Psi, Kappa Sigma, Lambda Iota, Phi Gamma Delta, Phi Delta Theta, Phi Mu Delta, Sigma Alpha Epsilon, Sigma Nu, Sigma Phi, Sigma Phi Epsilon, Tau Epsilon Phi, Theta Chi and Zeta Beta

Tau. Chapters of the following national sororities are represented: Alpha Chi Omega, Alpha Delta Pi, Delta Delta Delta, Gamma Phi Beta, Kappa Alpha Theta, and Pi Beta Phi.

MUSICAL ACTIVITIES Opportunities for participation and appreciation are provided for students with strong musical interests. The University Band, the University Choir and the Choral Union, the University Madrigal Singers, and the University Orchestra appear in public presentations many times during the year. An opera or musical show is generally presented each year and faculty, senior, and monthly department recitals are scheduled throughout the year.

The University Band appears at military reviews, University of Vermont Winter Music and Film Festival, and football games, presents two formal concerts, and makes a spring concert tour. The University Choir and the Choral Union give three annual concerts and the Madrigal Singers sing for various groups around the State. The University Orchestra presents two annual concerts, assists the Choir in a third, and plays for musical productions.

UNIVERSITY OF VERMONT WINTER MUSIC AND FILM FESTIVAL The outstanding social event of the year is the Winter Festival in February. Festivities include a ball at which a king and queen are crowned, snow sculptures, a jazz concert, and a special skiing program. Fraternities, residence halls, student organizations and other independent groups compete with one another in the presentation of original films and skits.

The aims of the Film Festival are to create a common ground for competition between organizations within the University community to enhance the unification and total participation of all competing groups; to provide a medium of competition that is flexible enough to move with contemporary trends and interests; to challenge the industry and creativity of all competitors in the University community and to present a production which will afford a superior form of entertainment to the more than 8,000 people who will audience it.

DRAMA, DEBATING, TELEVISION, AND RADIO The Arena Theatre in the Fleming Museum is the home for the Season of Plays presented each year by the Department of Speech and Dramatics with the University Players, as well as the home for the annual Champlain Shakespeare Festival. The great periods of Theatre history are covered during the course of four years in the Major Play Series. Workshop productions of original and experimental theatre forms are also produced as part of the regular course work in

Theatre as well as by students and faculty outside of the regularly scheduled course offerings. The Departments of Music, Speech and Dramatics, and Women's Physical Education collaborate periodically to produce a musical comedy or opera. Participation in drama activities is open to all members of the University.

The Lawrence Debate and Discussion Club provides opportunities for participation in all types of forensic activities—debate, discussion, oratory, after-dinner, and extemporaneous speaking. Members of the club appear before service clubs, farm organizations, high schools, and other groups throughout the state. The members of the club participate in more than three hundred intercollegiate debates annually, with the beginners getting as extensive an experience as the veterans. The club travels to various discussion programs and to outstanding tournaments in the East. Outstanding performers receive recognition by election to Delta Sigma Rho-Tau Kappa Alpha, the national honorary forensic fraternity.

Two radio stations and one television station are located on campus. WRUV-AM is a wired-wireless station which has been broadcasting primarily to the campus since 1954. It is managed and staffed by undergraduate students. WRUV-FM is a 10-watt-educational station which began operation in 1965. Under faculty supervision, students operate this station as an integral part of the academic program in broadcasting offered by the Department of Speech. The station serves the area within 10-15 miles of the University. Opportunity is provided for students to participate in the production of these programs.

STUDENT PUBLICATIONS A college newspaper, a literary magazine, and an annual yearbook offer interested students the opportunity for journalistic, literary, and editorial expression. The newspaper, the *Vermont Cynic*, is published on a scheduled basis by the students. The *Ariel*, the annual yearbook, published by members of the senior class. The annual *Freshman Record Book* for all incoming students is published by a committee of the Student Association. *Departure* is the student-supported literary magazine.

CLASS ORGANIZATIONS The members of each freshman class form a class organization which retains its identity throughout the undergraduate years of its members and extends through subsequent years as long as there are living alumni of the class. Members of each undergraduate class elect officers each spring, except that officers elected at the end of the junior year serve through the senior year and to the end of the first reunion. Each senior class conducts the events of Senior Week.

V The Admission of Students

The University of Vermont welcomes applications from all interested students regardless of race, religion, nationality or sex.

To be fully qualified for admission an applicant must have his completed application on file with the Director of Admissions before February 1 of the year in which admission is sought. Applications filed after this date can be considered only as curriculum and dormitory capacities allow. Forms for admission will be sent upon request. A non-refundable application fee of \$15 is required of all applicants.

Admission to the freshman class is selective and is determined after careful consideration of the high school record, rank in graduating class, recommendation of the high school principal, and scores on the College Entrance Examination Board Scholastic Aptitude Test. A personal interview may be requested by the Director of Admissions. The Scholastic Aptitude Test should be taken not later than the January testing date in the senior year.

Candidates for admission are expected to present not less than sixteen units from high school. These normally include:

English	Four years
Mathematics (as specified below)	Two years
Foreign Language, ancient or modern	Two years of one
Science	Two years
Social Studies	Two years

The two years of mathematics should be one year of algebra and one year of geometry. One year of social studies should be European or world history; or European or world geography. Students who plan to specialize in engineering, forestry, mathematics or science should present both a second year of algebra and a course in trigonometry for a total of four years of mathematics. For students planning to major in nursing, high school courses in biology, chemistry, and physics are highly recommended.

Exceptionally qualified students may in some instances be admitted even though they do not meet the above requirements in full.

Additional courses in mathematics, history, science, the fine arts and music, and a third year in the foreign language are recommended as desirable preparation for college. In evaluating the secondary school record, careful attention is given to the course load a student has been carrying and any advanced work is given special consideration. A student planning to major in music must arrange for an audition and interview with the chairman of the music department during the year preceding entrance.

Types of Enrollment

DEGREE STUDENTS Students who have presented appropriate credentials for admission and have been accepted as students in a degree program.

NON-DEGREE STUDENTS Students who have presented minimum credentials and are permitted to undertake *limited* course work for a purpose *other than* the earning of a degree. Non-degree students must be officially approved and registered as such, and are subject to all regulations of the University.

Undergraduate Non-degree Students, those seeking *only* undergraduate credit for course work taken, apply for approval to the Division of Continuing Education which will act as their college office.

Graduate Non-degree Students, those seeking graduate credit must apply for approval to the Graduate College.

College Entrance Examinations

The College Entrance Examination Board will administer a series of tests during 1972 on November 4, and December 2, and in 1973 on January 13, March 3, April 7, May 5 and July 14. Complete information may be obtained from the College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey 08540.

Transferring to the University

Students interested in transferring to the University may apply for admission in either January or September. Applications for mid-year admission should be filed by December 15, 1972. Applications for fall admission should be filed by February 1, 1973. Transfer candidates should see that official transcripts of their high school and college

records as well as a confidential report from the college previously attended are sent to the Office of Admissions in time for prompt consideration.

A student who transfers to the University from another accredited college or university may be given provisional credit for all courses satisfactorily completed, provided that similar courses are counted toward graduation at the University of Vermont. Transfer credit is not allowed for work completed with grade "D" or its equivalent, unless a more advanced course in the same subject has been passed with a higher grade in the institution from which the student transfers.

The credit is provisional, pending satisfactory completion of a semester's work at the University. The provisional transfer credits are fully granted if the student is in good standing at the end of the first semester.

Advanced Placement and Advanced Credit

The University of Vermont welcomes applications from high school students who have taken college level courses offered in their high schools under the Advanced Placement Program of the College Entrance Examination Board. Departments will review Advanced Placement examinations and the scores received in order that qualified students may not be required to repeat work already covered adequately.

A student who has been granted Advanced Placement may, upon the recommendation of the department and the student's academic dean, use his Advanced Placement to satisfy distribution requirements for his concentration.

Students who receive Advanced Placement may also receive course credit toward graduation requirements, upon approval of the department and the student's academic dean.

Credit by Examination

A matriculated student who wishes to do so may, under the following conditions, receive credit for a course by taking a special examination.

A request for such an examination must be made in writing at least one month before the date of the examination, and it must be approved by the student's advisor, the chairman of the department in which the course is given, and the academic Dean, in that se-

quence. The student must neither have audited, previously received a grade, nor have attempted a prior special examination in this course at the University of Vermont or at any other institution of higher education. Upon passing the special examination, as determined by the examiner and the chairman of the department in which the course is given, the student receives credit, but not a grade, for the course.

Pass-No Pass Option

Students, starting with the sophomore year, may elect to take certain of their courses on a pass-no pass option, with approval of their advisor. Please see page 00 for additional details.

Orientation Program

Entering students are required to take the College Entrance Examination Board achievement tests in mathematics and modern foreign language in all cases where these subjects are to be continued in the student's curriculum. The scores on all tests are used in advising students regarding the course of study and the selection of courses. New students are required to come to the campus for a two-day orientation and enrollment. Schedules and dates of these meetings are mailed with the Certificate of Admission. The student will plan his course program with the advice of his advisor and academic dean and complete his registration for the September opening of college.

V Student Expenses

The student expenses outlined in the following paragraphs are only anticipated charges for the academic year 1972-73. Changing costs may require an adjustment of these charges before the opening of college.

APPLICATION FEE An application fee of \$15.00 is charged each applicant for admission to the University.

ORIENTATION FEE An orientation fee of \$21.50 is charged each new student to cover the costs of attending an orientation session.

DEPOSIT A deposit of \$50.00 is required of every applicant after he has received notification of his acceptance as a student at the University. This deposit is held until he graduates or discontinues his course of study, at which time the deposit minus any indebtedness to the University will be returned to him.

An applicant to an undergraduate college who gives written notice of cancellation of an application prior to July 15 will receive a refund of \$15.00.

TUITION The tuition charges are in accordance with the following schedule.

1. **VERMONT RESIDENTS**

All full-time students (twelve hours or more) \$950.00 per year
(\$475.00 per semester)

Part-time students (fewer than twelve hours) \$40.00 per credit hour

2. **NON-RESIDENTS OF VERMONT**

All full-time students (twelve hours or more) \$2400.00 per year
(\$1200.00 per semester)

Part-time students (fewer than twelve hours) \$100.00 per credit hour

SPECIAL CONDITIONS Undergraduate students who, by reason of conditions over which they have no control, require more than four years to complete the requirements for a degree shall be charged no more than the full tuition for four years.

In the College of Medicine students allowed to repeat a year are charged full tuition for that year.

In the Graduate College a tuition fee of \$25.00 per semester is charged each graduate student who has completed all course requirements but who is in residence for the purpose of completing his thesis.

FEES FOR COURSES IN MUSIC, PERFORMANCE STUDY Private lessons are approximately one-half hour in length, fifteen being given in each semester. Students who enroll as regular

full-time students in a music curriculum, paying full tuition, are charged one-half the regular rates for performance study for such courses as are required in the curriculum. All others pay the scheduled charge. \$60.00 per credit hour.

FORESTRY SUMMER PROGRAM The charges for the Forestry Summer Program (see page 81) are Vermont resident tuition \$200.00. Non-resident tuition \$288.00. In addition there may be charges for transportation.

TECHNICAL NURSING SUMMER PROGRAMS The tuition for the summer session (see page 126) will be at the summer session credit hour rate. Room and board are available for those desiring University housing.

ROOM CHARGE Rooms in college residence halls are rented for the academic year and the prices are uniform in all residence halls. For each occupant of a room in a residence hall, \$230.00 per semester is charged. The charge for a single room, when available is \$520.00 (\$260.00 per semester). The residence halls are closed during the University recess periods and the University reserves the right to use student rooms to house University students in any of the residence halls during these recess periods. Normal charges for use of certain electrical appliances may be levied upon occupants of the residence halls. A \$6.00 fee is charged each dormitory resident to be used for the Inter-Residence Association.

Written notice is required of any student cancelling his room contract. Any student cancelling his contract after June 30 but before the beginning of the Fall Semester, will be assessed a \$50.00 penalty. Unless specifically authorized by the appropriate Student Personnel Dean, no cancellations will be honored after the opening of the Fall Semester.

A room key deposit of \$1.00 per year is also required, and returned upon the surrender of the key.

BOARD All students who live in a University residence hall are required to have meal contracts for twenty meals per week at a cost of \$289.00 per semester. Students with meal contracts will be assigned by the University to appropriate residential dining halls. Members of a University fraternity which provides meal service may contract for that service with their fraternity.

LIBRARY BOND FEE A library fee of \$30.00 per year (\$15.00 per semester) is charged to all full-time students except those registered in the College of Medicine. Students enrolled in less than twelve hours but more than three hours will be charged a fee of \$15.00 per year (\$7.50 per semester). Students enrolled in three hours or less are not subject to the library fee. This fee is assessed by legislative act and turned over to the State of Vermont each year to the extent necessary to fund the debt retirement on the bond issue that was used to fund the construction of Bailey Library.

ATHLETIC BOND FEE An athletic fee of \$30.00 per year (\$15.00 per semester) is charged to all full-time students. Students have the privilege of using the facilities in the gymnasium at scheduled times. This fee is assessed by legislative act and turned over to the State of Vermont each

year to the extent necessary to fund the debt retirement on the bond issue that was used to fund the construction of Patrick Gymnasium.

STUDENT HEALTH SERVICE FEE A fee of \$22.00 each semester is charged to all degree students at the University of Vermont. Please see page 41 for services provided.

STUDENT ACTIVITY FEE Full-time undergraduate students enrolled are charged a fee of \$21.50 per year (\$10.75 per semester). This fee is allocated by the Student Association toward the support of student organizations and student activities. First-year medical students who enter the College of Medicine after three years in the College of Arts and Sciences are charged this same fee.

Graduate students, part-time students, and students in the College of Medicine may, by paying this fee, become entitled to the benefits listed above.

VERMONT PUBLIC INTEREST RESEARCH GROUP All undergraduate degree students are charged a special fee of \$3.00 per student per semester for the Vermont Public Interest Research Group. These funds are used for the operation of their activities. Students who choose not to participate in the Vermont Public Interest Research Group, shall be entitled to a full refund during the third week of each semester.

MEDICAL STUDENT ACTIVITY FEE All students in the College of Medicine are charged a fee of \$10.00 per year. This covers the cost of the medical year book and other student activities.

LOCKER-TOWEL FEE All men enrolled in physical education activity courses and those who wish to have an assigned locker must pay a four dollar locker-towel fee each year or any portion thereof. This fee provides a lock and clean towel after each use of the gymnasium facility.

PENALTY PAYMENT Failure to complete financial arrangements and registration by specified dates will result in a penalty of \$10.00.

ADVANCED DEGREE FEE A fee of \$35.00, payable during the semester prior to graduation, is charged degree candidates in the Graduate College.

Estimated Expenses Per Year¹

Estimated expenses (excluding transportation, laundry and spending money), based on the regular tuition for undergraduate students include the following:

1. Engineering students add about \$50 for instruments. Dental hygiene students add about \$225, and nursing students should add about \$125 in the sophomore year, for uniforms and special equipment.

Students in the professional nursing program add about \$75.00 for uniforms and special equipment prior to beginning clinical nursing experiences; students in the technical nursing program add about \$75 at the time of Freshman registration.

Resident Tuition	\$ 950.00
Non-Resident Tuition	2400.00
Meals (contract 20 per week)	578.00
Room (per person)	460.00
Library and Athletic Fees	60.00
Student Health Service Fee	44.00
Student Association Fee	21.50
Vermont Public Interest Research Group	6.00
Residence Hall Activities Fee	6.00
Books and Supplies ¹ (estimated)	165.00
Resident Total	\$ 2290.50
Non-Resident Total	\$ 3740.50

Payment of Bills

All fees and tuition for the semester (one-half of the above yearly total) are payable upon notification and not later than at the time of registration. Checks should be made payable to The University of Vermont. The University reserves the right to withhold all information regarding the record of any student who is in arrears in the payment of fees or other charges including student loans.

TIME PAYMENT The University has made arrangements with The Insured Tuition Plan of Boston for those who desire to budget annual costs in monthly installments. Information about the various payment programs is sent to each incoming student, or his parents, where applicable. For advance information, please write to:

Richard C. Knight Insurance Agency, Inc.
 Insured Tuition Payment Plan
 6 St. James Avenue
 Boston, Massachusetts 02116

Those students who desire time payment and who are faced with unusual circumstances which cannot be satisfied by the Insured Tuition plans should contact the Treasurer's Office. Approval for any special arrangements must be obtained prior to a registration period.

Refunds

TUITION

1. In the event of voluntary withdrawal from college, during the first week of any semester the full tuition is refunded; thereafter, 20 percent is retained by the University for each week that has elapsed.
2. Any student who has paid in full the tuition for a semester and who withdraws for reasons of health or other causes beyond his control before the end of the semester, may, with the permission of his college dean and in lieu of any refund, elect to enroll for a ninth (final) semester without charge for tuition.
3. If a student is suspended, no cash refund is made; the student and his parents are informed that a credit balance for the amount actually paid for tuition by the student or his parents will be retained on the Univer-

- sity's books and applied to his tuition charges, if he re-enrolls within three years of his suspension; no scholarship grants will be included in such credit.
4. If a student is dismissed for cause, a refund of tuition is made proportionate to the number of weeks remaining in the semester at the time of dismissal.
 5. In case of death of a student, tuition paid is refunded in full.
 6. A student who changes his status from full-time to part-time (fewer than twelve hours) by an approved change of enrollment during the first three weeks of a semester may be entitled to partial refund of tuition, gymnasium, and library fees, since the charges will be adjusted to fit his new status.

OTHER CHARGES AND FEES

1. Refund of payments for board is made on a *pro rata* basis.
2. There is no refund of room rent.
3. There is no refund of student fees (Library, Gymnasium, Student Activity), except as noted under 6. above under TUITION.

Check Cashing Facilities

The University Store cashes small personal checks for students in good standing on presentation of a current student identification card.

Financial Aid

Many worthy and deserving students are unable to meet college expenses and for them the University provides, so far as its resources permit, aid in the form of scholarships, loans, and employment. The extent of need and the type of financial assistance which can be awarded is determined by the Director of Financial Aid.

Entering students who want to apply for financial aid may do so by indicating their intention in the spaces provided on the Admissions Application Form and also submitting the Family Financial Statement directly to the American College Testing Program (preferably no later than April 1) with the notation that it be forwarded to the University of Vermont. The Family Financial Statement forms may be obtained from your high school or by requesting one from the Office of Financial Aid, 330 Waterman Building, University of Vermont, Burlington, Vermont 05401.

V General Information

Definition of "Vermont Resident" Adopted by Board of Trustees October 2, 1971

The Vermont Legislature has established a lower rate of tuition for students who are Vermont residents. Such a policy appears to have as its objective the attempt to more evenly distribute the cost of operating and supporting the University of Vermont between Vermont residents whose taxes have previously supported the University and non-residents who have not done so.

The Legislature has stated that enrollment at an institution for higher learning or presence within the State for purposes of attending an institution of higher learning shall not constitute residence for tuition purposes.

In determining whether a student is a "Vermont Resident" for tuition purposes, the following shall apply:

1. A student who has attained the age of majority or is an emancipated minor shall be deemed to be a Vermont Resident if the student shall have had his domicile in Vermont for a period of one (1) year preceding the beginning of the semester in which the student seeks to register.
2. A student who is an unemancipated minor at the beginning of a semester shall be deemed to be a Vermont Resident during such semester if and only if, his parents, guardian or whoever stands in loco parentis to the student, had their domicile in Vermont for one (1) year preceding the beginning of such semester.
3. A student who at the beginning of a semester has his domicile fixed by a special rule of law (as a student under guardianship, a married woman, etc.) shall be deemed to be a Vermont Resident during such semester if, and only if, the circumstances claimed to have made the student a resident shall have taken place at least one (1) year prior to the beginning of such semester; provided, however, that a guardianship of a minor student shall not be deemed a basis for residence, if the primary purpose of the guardianship is to qualify the minor for resident tuition.
4. Whenever a resident student shall lose his Vermont domicile (as in the case of a minor whose parent or guardian moves from Vermont but excepting women who lose such domicile by marrying non-residents) the student shall be reclassified as a non-resident effective at the beginning of the next semester for which the student enrolls; and it shall be incumbent upon any student whose status so changes from Vermont Resident to non-resident to inform the Dean of his college, or the Registrar, promptly, of the facts relating to his residence.
5. The term "domicile" shall mean the place where a person is physically present and where he intends to permanently remain as a true, fixed and permanent home.
6. A student who has attained the age of majority or is an emancipated minor shall be deemed to have his domicile in Vermont if:
 - a. his parents, guardian or whoever stands in loco parentis to the student were domiciled in Vermont at the time he reached his majority or was emancipated, and the student has not acquired a domicile in another state, or
 - b. he has established a bona fide domicile in Vermont in accordance with paragraph 5.

7. A student who is present in Vermont for the primary purpose of attempting to qualify for resident tuition status shall not be deemed to have a bona fide domicile in Vermont.
8. Neither a student's presence in Vermont for purposes of attending an educational institution, registration in Vermont for the purpose of the draft and voting, Vermont motor vehicle registration and drivers license, employment in Vermont, the ownership of real property in Vermont, or the payment of Vermont taxes shall, by themselves necessarily be determinative of a bona fide domicile in Vermont.
- 8a. A student who is eligible for tuition purposes to enroll as a resident student in another state shall not be enrolled as a "Vermont Resident."
9. A student from another state who enrolls in an educational institution of higher learning in Vermont shall create a rebuttable presumption that he is in Vermont for purposes of attending such institution and will not be deemed to have established a bona fide Vermont domicile.
10. In determining whether a student has established a bona fide domicile in Vermont it shall be relevant to ascertain whether the student is receiving support from or is being claimed as an income tax exemption by his parent, guardian or person standing in loco parentis.
11. Students enrolling at the University of Vermont shall be classified by the Director of Admissions as a resident or non-resident for Admission and Tuition Purposes. The decision by the Director of Admissions shall be based upon information furnished by the student and other relevant information. The Director of Admissions is authorized to require such written documents, affidavits, verifications or other evidence as he deems necessary.
12. The burden of proof shall in all cases rest upon the student claiming to be a Vermont Resident.
13. The decision of the Director of Admissions on the classification of a student as a resident or non-resident may be appealed in writing to the Residence Committee.
14. The Residence Committee may make exceptions to the above rules whenever justice requires.
15. Appeals from the decision of the Residence Committee may be made, in writing, to the Board of Trustees, whose decision shall be final.

Academic Discipline

CONDUCT The general principle governing the conduct of students is set forth in the following "ancient law" of the University:

The conduct of the students toward all men is to be regulated by those plain rules of politeness, honor, and religion which are binding on every free and virtuous community. They are to conform to every requirement of the faculty, which may arise from their relations as instructors, counselors and guardians, and as upright men and good citizens they shall use all lawful exertions to prevent and expose all violations of the laws of God and of the country, and whatever is at variance with the objects of the University.

Toward this end, the University expects each student to maintain high standards of personal conduct and social responsibility at all times both on and off campus. All students as responsible citizens, are required to observe and to share in the support of all local, State and Federal regulations. Any student who fails to uphold these standards is subject to disciplinary action by the University.

The disciplinary authority of the University is vested in the President. In such cases as he considers proper, this authority may be delegated to the several deans and to appropriate judicial bodies. **The continuance of each student**

at the University, the receipt by him of academic credits, his graduation and the conferring of any degree or the granting of any certificate are strictly subject to the disciplinary powers of the University. The University is free to cancel his registration at any time on any grounds, if it considers such action to be for the welfare of the institution.

University students and their parents are referred to the booklet *Privileges and Regulations for Students* in which University rules concerning discipline and academic procedures are given in detail. Each student is responsible for knowledge of these.

Policy Statement on Campus Dissent and Disruption Adopted by
the Trustees on December 5, 1970

The University of Vermont is a place to learn and to teach. It is not a cloister—it does not live in a vacuum. It is both in the world and of the world. Its mission is to educate people for leadership in society.

Board of Trustees, May 1969

As the above quotation suggests, the University functions within the rules governing a larger society. It was created by that society for a special purpose: the facilitation of learning and teaching.

It follows that the University's regulations must conform with the law as well as take account of the particular role of educational institutions.

Fundamental to our entire philosophy is our firm belief that rights guaranteed by the First and Fourteenth Amendments to the Constitution of the United States must be protected on the campus as elsewhere in our society and further, that civil laws must prevail on the campus.

Within the University setting as within society at large, the exercise of one's rights must be tempered by recognition of the rights of others. For example, the exercise of free speech may unreasonably infringe upon the right to learn. It should not be surprising that conflict may arise between parties engaged in activities which are individually lawful, for a fundamental function of social organization is the reconciliation of competing interests.

Within the University setting more than any other, the appropriate means for conflict resolution is rational discourse. The processes fundamental to the existence of the University cannot be abandoned under stress, especially since they represent the most effective means for progress. Further, the criteria employed to seek lawful accommodation of various interests must grant special attention to the central mission of the University; learning and teaching.

The laws of society and the mission of the University establish the framework within which disagreement, dissent, demonstration, and advocacy may, indeed must, occur. For mankind to progress, the educational process must be dynamic even if fraught with controversy, for change cannot take place until the first question is raised. The discovery of new propositions or new solutions also may be followed by passionate advocacy. Such advocacy must never replace the continued pursuit of the University's essential purpose of learning and teaching.

It is within this context that the University rejects the use or threat of force as a means of resolving differences. Violence is both unnecessary and inappropriate for those who have access to reasoned discourse and is unacceptable within an institution dedicated to reason. For those who will not or cannot contend within this arena, the University must, after efforts at persuasion have

failed, resort to the use of any legal remedy deemed necessary. Such persons, consequently, may expect appropriate responses from either the University or civil authorities or both. Normally, the University will respond first, when failure to do so would present a clear and imminent threat to proper functions of the University. Civil action will be invoked when non-students are involved or when the severity of disruption requires such a step.

GUIDELINES

Since a clear differentiation between legitimate dissent and coercive disruption is difficult, it is the purpose here to provide explanatory guidelines:

1) The Board of Trustees, Administration, Faculty, Staff, Alumni, and Students recognize the crucial importance of maintaining open communication and dialogue in the process of identifying and resolving problems which evolve from the dynamics of University life.

2) Coercive disruption initiated by any person or persons within the University community will be met by that action of the University which is necessary to restore order and the communication required for rational solution of problems. Such action may include suspension, expulsion and/or arrest. Coercive disruption is generally defined here as activity which imposes the will of other persons or groups within the University community, outside of established procedures for the expression of opinion and the resolution of differences.

Coercive disruption is construed to include activity which:

- a) Denies the rights of students, the faculty, the staff or guests of the University.
- b) Disrupts or obstructs educational and other activities of the University.
- c) Reacts to the expression of the peaceful discourse of dissent of others by attempting to deny their rights.
- d) Obstructs or restricts free movement of persons on any part of the University campus.
- e) Denies the proper use of offices or other facilities to the students, faculty, officers, staff, or guests of the University.
- f) Endangers the safety of any person on the University campus.
- g) Threatens, or results in, the destruction of property.

It is to be understood that the phrase "educational and other activities of the University," includes the duly registered and lawful activities of recognized student organizations as well as other agencies of the University.

3) Because of its purpose, nature and function, it would be self-defeating for a University to attempt to prohibit or to even discourage dissent. Lawful and peaceful demonstration as an expression of favor or dissent should be permitted and protected.

4) Members of the academic community must be free to organize, discuss, pass resolutions, distribute leaflets, circulate petitions, picket and take other action which is not only lawful, but consistent with University policies and procedures; but they have an obligation to preserve the University's free and unhampered search for truth.

5) The activities of an individual or group of individuals cannot be allowed, in the name of free speech, to disrupt or interfere with the educational program.

6) Trespassers may be arrested and removed from University premises. Failure of a person on University property to follow a reasonably founded request to leave University facilities, expressed by one duly authorized to make such a request, makes him a trespasser.

7) The University may decide to exercise its authority as property owner to eject members of the public who seriously abuse their privilege of coming upon the campus.

8) When groups organize a demonstration on campus which becomes disruptive, action may be taken against the group as well as individuals involved.

9) Becoming a member of the University community in no way abrogates, or compromises the rights which the Constitution of the United States guarantees to all persons. This principle applies to the adjudication of violations of campus policies as well as all other areas.

Policy Statement on Discrimination Adopted by the University

Senate September 13, 1968

As a public institution, the University of Vermont opens its doors and facilities to any student on the basis of his or her character and ability and irrespective of race, religion, color or nationality.

Use of English

Correct English usage is demanded by all departments in the University. Written work of any kind which is unsatisfactory in manuscript form, grammar, punctuation, spelling, or effectiveness of expression may be penalized, regardless of contents. Students whose written work falls below the standard of correct usage may be remanded to the English department for additional instruction, even though the freshman course in English has been passed.

Before they may be admitted to the University, foreign students must offer evidence that they are capable of reading and writing English on the college level.

Reserve Officers' Training Corps

GENERAL Through Army ROTC college graduates receive regular or reserve commissions as officers in the United States Army. The University's Department of Military Studies offers courses in world military affairs to all University students, whether or not they are members of ROTC. Additionally, special courses for ROTC cadets offer basic education and training in military subjects, with emphasis on leadership.

PROGRAMS Two programs are offered: (1) A four year program comprising one course per term and a summer camp for six weeks between junior and senior year. (2) A two year program comprising one course per term during the junior and senior years, and two summer camps for six weeks each. Students are given pay and travel allowance for summer camp(s).

SCHOLARSHIPS Scholarships, available for four, three, two years and one year, provide tuition, books, laboratory fees and similar educational expenses, plus \$100.00 a month. The commitment is four years on active duty.

Applications for the four-year scholarships are made during the senior year in high school. Normally the cut-off date for submission is in January. News media keep the public informed as to the exact date. Interested students should request application forms from the U.S. Army Headquarters nearest to their home. Students living in the Eastern United States should write to: Commanding General, First United States Army, ATTN: AHAAG-CA, Fort George G. Meade, Maryland 20755.

FLIGHT TRAINING The Army ROTC Flight Training Program is open to qualified seniors. It is designed to train a reserve pool of Army aviators and affords students the opportunity to qualify for a Federal Aviation Agency private pilot's license. On-campus ground and flight instruction under FAA licensed instructors is provided without cost.

POSTGRADUATE DEFERMENT Upon graduation, ROTC students are normally commissioned as officers in the U.S. Army Reserve and agree to serve on active duty for two years, subject to call to such duty. However, active duty may be deferred for as many as four years for those who wish to pursue an advanced degree while studying as full-time graduate students.

Physical Education

One year of physical education, normally completed during the freshman or sophomore years, is required of all undergraduate students. Medical examinations are required of all new students. Those with serious defects may be given restricted work or may be excused by the Director of Student Health. Students twenty-five years of age or older are exempt from physical education requirements. The semester hours listed for physical education are in addition to the total number of hours required for graduation in a specific curriculum.

University Responsibility

Many courses involve instruction in and the use of various types of power equipment, laboratory apparatus, and specialized facilities. The University takes every precaution to provide competent instruction and supervision of such courses. It is expected that students will cooperate by following instructions and exercising precaution. In case an accident does occur resulting in personal injury, the University can assume no responsibility except for medical care that is provided by the Student Health Service.

Student Health Insurance

Through an arrangement with a commercial insurance company, students are able to procure a policy providing for payment up to \$3,000.00 for each illness or each accident. The present cost for one year's coverage is \$29.00. Married students may procure coverage for their spouse and children. Further details may be obtained from the Treasurer's Office, Room 358, Waterman Building.

Enrollment and Registration

Every student is required to enroll and register for each semester on the designated days, unless excused in advance by the dean of the college concerned. Any student in attendance who does not enroll and register for the next semester at

the designated time will be considered as a dropped student and may apply for readmission after one semester. Specific directions are published for each semester.

Changes in Enrollment

Any changes in enrollment must be authorized by the dean of the college in which the student is registered. A student may add a course only during the first week of classes, but may drop a course without academic penalty during the first five weeks of classes. Change of enrollment forms are obtained from the departmental offices or advisers.

Auditing Courses

With the approval of the Dean and the instructor concerned, a regularly enrolled student carrying a normal program may audit a course. Others who do not wish to receive credit, or who have not met admission requirements, may also register as auditors. Auditors have no claim on the time or service of the instructor, the course is not entered on the permanent record, and no grade credit is given for the work. For students paying full tuition, no additional charge is made; for all others, tuition is charged at the applicable rate. Under no circumstances will a change be made after the enrollment period to allow for courses audited.

The approval of the Dean of Evening Division and Summer Session is necessary for auditing courses in those divisions.

Undergraduate Degree Requirements

Degrees are conferred on the recommendation of the several colleges and specific requirements will be found in the sections devoted to the respective colleges.

In addition to the course requirements of the several curricula, students must also fulfill the general requirements in physical education.

To be eligible for graduation, a student must have attained a cumulative average sufficient to meet the minimum requirements for the college in which the student is officially enrolled. Grades in courses accepted for transfer credit are excluded in computing this average.

Every candidate for a degree is required to have taken 30 of the last 42 semester hours of credit in residence at the University except that those who have completed three years of premedical study in the University are awarded their degrees after successful completion of one year of study in any approved college of medicine. Other exceptions to this rule may be made only on recommendation of the Academic Council and in cases of undue hardship. To qualify for a second bachelor's degree the candidate must have fulfilled all the requirements for the degree and must have taken a full year of work in addition to that taken to qualify for the first degree.

Honors

The Bachelor's degree may be conferred with honors, by vote of the Senate, in recognition of general high standing in scholarship. Three grades are distinguished and indicated by inscribing on the diploma the words *cum laude*, *magna cum laude*, or *summa cum laude*. In the College of Medicine, the five students who have attained the highest average of marks during the entire four

years' course are graduated *cum laude*. The names of those who receive these honors and of those who win academic awards are printed in the commencement program.

Dean's List

The deans of the undergraduate colleges publish at the beginning of each semester the names of those full-time students who have attained an average of at least 3.0 in their college credit courses during the preceding semester.

Grades and Reports

Grades are reported and recorded as letter grades. Averages are calculated from quality point equivalents.

A	Excellent	4 points per semester hour
B	Good	3 points per semester hour
C	Fair	2 points per semester hour
D	Poor	1 point per semester hour
F	Failure	0 points per semester hour

Penalties for Low Scholarship

The information below describes the general University regulations for low scholarship standing. The Studies Committee of each college may determine additional or supplementary requirements. Students with questions regarding their academic standing should consult with their college dean.

1. "On Trial"—

- a. "On trial" is an intermediate status between good standing and dismissal. The student remains enrolled but under stated academic conditions according to college policies.
- b. Students are placed "on trial" by the dean, or the designated committee of the college concerned, who may also set the special academic conditions of the trial in each case. Normally the period of trial is one semester.
- c. The circumstances under which students are placed "on trial" are as follows:
 - (1) Any student who is readmitted to the University after having been dismissed for low scholarship re-enters "on trial."
 - (2) Generally a student is placed "on trial" if in any semester he has failed half or more of the hours of his enrollment but has been permitted to continue in college.
 - (3) A student whose record has been consistently below the graduating average or generally unsatisfactory in any semester may be placed "on trial" or continued "on trial" even though he does not come within the provisions of section (2).
- d. A student who has earned fewer than thirty semester hours of credit and is "on trial" is barred from participation in all athletic and other student activities.

2. Separation—

- a. A student is dismissed from the University if he receives grades below

passing in one-half or more of the semester hours of his enrollment in any semester unless he is allowed to continue by action of the designated committee.

- b. A student who fails to meet the condition of his trial or whose record has been unsatisfactory and consistently below the graduation average may be dismissed for low scholarship even though he does not come within the provision above.
- c. A student dismissed for low scholarship must address his application for readmission to the college from which he was dropped.

PASS—NO PASS course enrollments have been approved by the University Senate for implementation in September 1968. The action was taken in two parts:

FIRST, that any degree program student, not on academic trial, be permitted to take as many as six courses (or as many courses as he has semesters remaining for future transfer students) during his undergraduate career on a Pass—No Pass basis, beginning in his Sophomore year. These courses may not include any required by the student's major department, either for the major or for the degree. The student must complete all work normally required in these courses and he will receive full credit toward graduation for passing them. The instructor will NOT be informed of the student's status and the Registrar will record grades of "D" or higher as PASS and grades of "F" as NO PASS. Neither "P" nor "NP" grades will affect the student's grade-point average.

SECOND, that, in addition, any John Dewey Fellow may be permitted to take all his courses in a given semester on a PASS—No Pass basis, including his required courses. He may do this, after consultation with his adviser, as many semesters as he chooses, beginning in his sophomore year. The instructor will be informed of the student's status and may impose special work requirements for the course. The student will receive full credit for passing these courses. He may request any of his instructors to file a written evaluation of his work (NOT a grade) with the Registrar to be available, at the student's request, to admissions committees, employers, and the like.

Procedure—

1. Obtain a PASS—NO PASS Request Form from the Registrar's Office and consult your academic adviser.
2. Obtain your adviser's endorsement that the request conforms to the policy established by the University Senate. Any question about a course or courses being appropriately elected as Pass—No Pass for a student will be resolved by the student's college dean.
3. Submit your request to be placed on Pass—No Pass status at the Registrar's Office during the first five weeks of the semester. Requests to be removed from that status must be filed during the same period.

Repeated Courses

A student who repeats a course loses any previous credit on record for that course. The previous grade is included in computing his cumulative grade average.

Academic Advisers

The policy regarding the selection of academic advisers is determined by each college. Students having questions, or requesting a change of academic adviser, should consult the dean of their college.

Intercollege Transfers

A student who is or has been a member of any college of this University may transfer to another college of the University only with the consent of the deans of the two colleges concerned. In the case of veterans receiving educational benefits through the Veterans Administration, the change must also be approved by the adviser to veterans in the Registrar's Office.

Withdrawal

A student who wishes to withdraw from college must first notify his academic dean and the Student Personnel Deans, in person or in writing.

Attendance

Class Attendance—Every student is expected to attend all regularly scheduled classes. This is a major responsibility of the student toward himself and toward the University. The primary penalty for non-attendance lies in the student's lessened grasp of the subject matter of the course.

It is the responsibility of the student to inform the instructor regarding reason for absence from class.

Absence from Classes—Each department is to inform all students in its classes at the beginning of each semester of its policy for handling absences and the penalties that may be imposed.

Failure to do any work for which a grade is given, if due to unexcused absence, may result in a failing grade for that particular work.

Absence from Semester Final Examinations—

1. A student who is absent from an examination for any reason must report that fact and the reason, in person or in writing, to his academic dean within twenty-four hours. If the absence was due to illness, a statement from the University physician must be presented. On the basis of this information, the dean may excuse the absence, in which case the grade is reported as "incomplete," and the student may take the examination at a designated time.
2. If the absence is not reported as described above, or is not excused by the academic dean, the course is recorded as failed.

Absence from Graduation Exercises

All recipients of degrees will attend graduating exercises.

Priority of University Exercises

University academic responsibilities have priority over other campus events. Attendance at:

1. Regularly scheduled classes have priority over special scheduled common hour examinations.
2. Common hour examinations have priority over attendance at other activities.

Tardiness

A student not present at the beginning of an exercise may be marked absent.

Right of Appeal

Any student who believes that he has been unfairly treated in regard to absences may appeal to his academic dean.

Other grades are:

Inc. Incomplete. This grade applies to work of acceptable quality when the full amount is not completed because of illness or other emergency. It can be awarded only with the permission of the student's college dean. The dean may set the limit of time when the work of the course is to be completed. In no case shall this time be set longer than the beginning of the corresponding semester of the next academic year.

NP Not Passed, not used in average computation.

P Passed, not used in average computation.

W Withdrawn, without penalty, not used in average computation.

WF Withdrawn, failing. This grade is weighted as an "F" in the computation of averages.

A quality point average of 1.70 is the minimum graduating average. All students enrolled in the undergraduate colleges receive reports of final grades from the Registrar after the close of each semester. Special reports of low standing are sent by the deans' offices about the middle of each semester to the students concerned.

Each student, former student, or graduate student may procure one photostatic transcript of his record without charge. For additional orders the charge is one dollar for each transcript.

V The College of Agriculture and Home Economics

The College of Agriculture and Home Economics performs four public functions: it teaches resident students; investigates problems; disseminates information; and performs related services. These four areas of work are performed respectively by the resident instruction division, the research division (Vermont Agricultural Experiment Station), the extension division (Vermont Cooperative Extension Service), and the Related Services Division.

The curricula of the resident instruction division prepare students for professional careers. Upon receiving the bachelor's degree, students are offered employment in management, specialized services, education, and research—all these in areas related to agriculture, family and consumer science, conservation, recreation, and international service.

The evolution of society necessitates continual progress and change, especially in technology, management of natural resources, and human relationships. Thus the challenge of preparing students to excel now, yet adjust to future changes, is being met through programs designed to give a foundation in the social sciences and humanities plus a fundamental technical education. These programs encompass such areas of study as agriculture, forestry, home economics, preveterinary medicine, and biological sciences.

Most programs in the College of Agriculture and Home Economics leading to the Bachelor of Science degree require 120 semester hours of prescribed and elective courses, plus credit for required courses in physical education. The Forestry Program requires 138 semester hours of prescribed and elective courses, eight hours of which are earned during an eight-week summer program of instruction between the sophomore and junior years. (See page 54 for expenses.) The normal semester program includes fifteen to eighteen credit hours of courses plus physical education.

In each area of study certain courses are prescribed, with allowance made for the election of additional courses, to provide a well-balanced and integrated educational program and to insure reasonable concentration. Faculty advisers counsel students in the selection of elective courses and educational problems.

THE HONORS PROGRAM

This program is designed to help the superior student. It provides an environment for such students which will insure that they are constantly challenged by the most advanced work their talents will allow.

Students are selected on the basis of their academic performance—usually after the completion of the sophomore year. Their curricula are developed in consultation with their adviser and an honors committee. Special colloquia or consultations may be arranged in lieu of regular class work. Prerequisites may be waived, and in general the student is encouraged to work as an individual.

DEGREE REQUIREMENTS

The degree of Bachelor of Science is awarded in each of the following programs:

Biological Science
Environmental Studies
General Studies
Recreation Resource Management
Agricultural Economics
Resource Economics
Foreign Service
Applied Technology and
Agricultural Engineering
Laboratory Animal Technology
Preveterinary Science
Animal Industry
Animal Technology
Basic Animal Science
Dairy Technology
Hospitality Industry

Botany
Forest Management
Wildlife Management
Biochemical Science
Plant and Soil Science
Occupational and
Extension Education
Clothing, Textiles and Design
Early Childhood Programs and
Services
Home Economics Education
Human Development
Housing and Home Management
Human Nutrition and Food
Dietetics
Social Welfare

The programs are broad and flexible, with sufficient areas of concentration and electives to meet the specific needs and desires of the student. Therefore, responsible departmental advising is important in the development of each student's program. Every candidate for this degree, in consultation with his adviser, must choose one of the above programs upon entering the college. The candidate must then fulfill the requirements stated below.

Required of All Students

- A. The successful completion of a minimum of 120 credit hours of course work plus credit in required courses in physical education.
- B. The successful completion of at least two courses in each of the following areas:
 1. Fine arts and humanities
 2. Science and mathematics
 3. English, speech/drama, and writing
 4. Social sciences

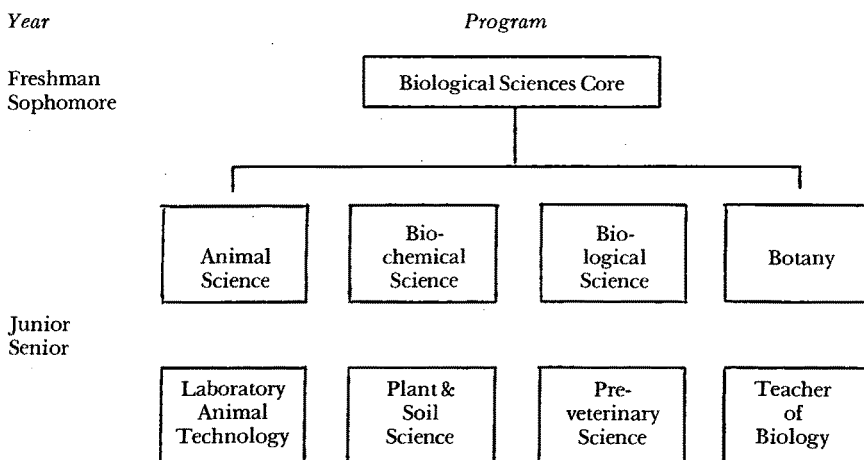
Applicability of courses to specific areas will rest with the adviser and, if necessary, with the concurrence of the dean of the college. It is further recommended that courses chosen to fulfill these requirements be taken outside the department in which the student's program of study is located. Students desir-

ing to complete teacher education programs and teacher certification must enroll in appropriate courses in the college of education. (see College of Education Advisor—306 Waterman)

PROGRAMS OF STUDY

BIOLOGICAL SCIENCES CORE Students initially interested in general biological sciences may enroll in this interdisciplinary core curriculum for the freshman and sophomore years. In addition to general college requirements, students must complete during this time a year of mathematics, biology, and three semesters of chemistry and biochemistry.

During the sophomore year the student decides upon a field of concentration in which to major. Sample options available upon completion of the core curriculum are as follows:



BIOLOGICAL SCIENCE PROGRAM Students desiring to major in biology may enroll in this option. The program provides students with a sufficient foundation in the biological sciences and supporting subjects to prepare them for graduate study or positions requiring a general biology background.

Required courses:

First two years same as "Biological Sciences Core."

Junior and Senior years (12 courses as follows)

Required:

Zoo. 101 Genetics

Zoo. 103 General Structure and
Function

Physics 5, 6 Elementary Physics

Math. 110 or 200 Statistics

2 courses from:

Zoo. 209 Field Zoology

Bot. 109 Systematics and Phylogeny
 Bot. 105 Developmental Plant Structure
 Zoo. 150 Invertebrate Zoology
 Pl. & Soil Sci. 138 Plant Propagation

3 courses from:

Zoo. 104 Comparative Structure and
 Function
 An. Sci. 158 Avian Biology
 Bot. 104 Physiology of the Plant Body
 Bot. 117 Plant Pathology
 An. Sci. 271 Endocrinology
 Micro & Biochem. 55 Introductory Mi-
 crobiology
 Micro & Biochem. 202 Adv. Biochemis-
 try
 Micro & Biochem. 203 Molecular
 Biology
 An. Sci. 170 General Physiology
 Pl. and Soil Sci. 108 Forest Entomology

2 courses from:

Bot. 160 Plant Ecology
 Zoo. 102 Environmental Zoology
 Micro & Biochem. 220 Environmental
 Microbiology
 Pl. & Soil Sci. 102 Natural Resource
 Conservation
 For. 242 Advanced Biometry

ENVIRONMENTAL STUDIES PROGRAM This program is offered to provide edu-
 cation in various areas of concern for
 our environment. The student is offered a University-wide, cross-discipline
 program in environmental studies. This curriculum provides for either a
 "generalist" or an "in-depth" approach to a study of the many problems of
 our environment.

There are 120 credit hours required for the degree. A core of required courses
 which is designed to be common to both of the above approaches is as follows:

<i>Required Courses</i>	<i>Credit Hours</i>
Two courses in communications	6
Two courses in physical or biological sciences: Botany, Chemistry, Geology, Physics, Zoology (not to include Biology 3)	8
Two courses in social sciences (1 course each in 2 different fields)	6
Two courses in fine arts, humanities	6
Five credit hours in mathematics and statistics	5
*Introductory Plant & Soil Sciences—P&SS 11	3
*Introductory Animal Science—AS 2	3
Environmental Studies 1, 2	6
Environmental Practicum, 191	TBA+
Advanced Environmental Quality 195, 196	6
Total	49+

*May substitute Biol. 1, 2, Principles of Biology (8 credits—Add 2 to total shown
 above)

+Credit to be arranged.

Additional Requirements

1. The student selecting the in-depth approach will satisfy the requirements for a concentration(s) in an environmentally related department(s). In addition, students with a single area of concentration will take two or more environmentally related courses in each of five additional departments. Students with a double area of concentration will take two or more environmentally related courses in each of two additional departments.

2. The student selecting the generalist approach will take two or more environmentally related courses in various departments throughout the University chosen in consultation with his adviser.

GENERAL STUDIES PROGRAM This program is designed for students seeking a general rather than a specialized knowledge in the field of agriculture and related subjects. Through the proper selection of electives, a student may choose an area of concentration within the college and also select courses that contribute to a liberal education.

Required: In addition to the basic college requirements each student must satisfactorily complete twenty-four hours in the College of Agriculture and Home Economics. All additional courses must be selected in consultation with and have the approval of the student's adviser.

RECREATION RESOURCE MANAGEMENT This program is designed to prepare students for professional careers in the management of recreational resources. These recreational resources include national, state, regional, county and urban parks, campgrounds and recreation areas, as well as privately managed ski areas, campgrounds, hunting and fishing preserves, and other specialized recreational areas and facilities.

Due to the diversity of recreation resources and opportunities, students are given the opportunity to pursue a course of study which is both geared to their area of interest and compatible with professional requirements. Professional compatibility of the curriculum is developed and maintained through periodic consultations with professionals in the field.

All majors in Recreation Resource Management are required to successfully complete a series of core courses during the freshman and sophomore years. Upon completion of the sophomore year the student may elect to concentrate in one of three areas: Private Recreation Management, Rural-Urban Park and Recreation Management, and Outdoor Recreation Management. In addition to formal course work, each student must also complete two months of seasonal employment in his chosen area of concentration prior to graduation.

Department of Resource Economics

Each student majoring in programs offered within this department shall successfully complete a minimum of 30 hours in the social sciences. Of these, at least 24 hours shall be in resource Economics or Economics, of which at least 12 hours shall be Resource Economics courses requiring advanced standing. All courses must be selected in consultation with the student's departmental adviser.

AGRICULTURAL ECONOMICS This program provides students with a basic understanding of economic theory and concepts that apply to the fields of agribusiness, marketing, farm management, and agri-

cultural policy. Students in this program prepare themselves for work in business management, farming, extension, sales, and marketing.

RESOURCE ECONOMICS This program deals with the application of economic theory to natural resource allocation problems. It prepares an individual to use the logic of economics and the perception of conservation to recommend the efficient and equitable use of natural resources. Graduates will be prepared for positions in natural resource management, planning, and administration.

FOREIGN SERVICE This option is designed for students interested in economic development or business in foreign countries.

Department of Animal Pathology

PREVETERINARY SCIENCE Veterinary Medicine today offers more challenges and new opportunities than ever before. Since there are only 18 colleges of veterinary medicine nationwide and some have student contracts with neighboring states, candidates preparing for admission must compete with many applicants with superior grades. Cornell University and the University of Pennsylvania, the two nearest colleges, now require 3 years (90 semester hours) of preveterinary college work. In addition Cornell requires experience with farm animals and applicants are encouraged to work with a practicing veterinarian.

The preveterinary science program leads to the degree of Bachelor of Science. Students with a 3.2 point (B+) average or better may apply to colleges of veterinary medicine at any time after completion of admission requirements. The majority of applicants accepted have the Bachelor of Science degree. Opportunities for graduate veterinarians include large and small animal practice, teaching and research, public health, the armed services, pharmaceutical laboratories, meat inspection, laboratory animal medicine and federal, state and municipal disease control work.

Elective courses will be selected in consultation with department advisers to provide concentration in a major undergraduate area. Students not accepted in colleges of veterinary medicine will thus have a field of concentration and could qualify for graduate college if they so desire.

		1st	2nd
The Freshman Year		SEMESTER	SEMESTER
English	Freshman English	3	3
Chemistry 1-2	Intro. Chemistry	4	4
Biology 1, 2	Prin. of Biology	4	4
Math 9	College Algebra	3	—
Math 2	Plane Trigonometry	—	3
	Electives	—	2-5

Note: No electives for 1st semester

		1st	2nd
The Sophomore Year		SEMESTER	SEMESTER
Chem 131-132	Organic Chem	4	4
Physics 5, 6	Elem Physics	4	4
Zool. 101	Genetics	3	—
Speech 11	Public Speaking	—	3
	Social Sciences	3	3
	Electives	2-5	2-5

		1st	2nd
The Junior Year		SEMESTER	
Microbiol 201	Genl. Biochem	4	—
An Path 105	Animal Anatomy	3	—
Math 25	Fund. of Calculus	3	—
Microbiol 55	Intro Microbiol	—	4
An Path 106	Animal Diseases	—	3
An Sci 170	Gen. Physiology	—	3
An Sci 246	Adv. Nutrition	—	3
	Electives	6-9	3-6

		1st	2nd
The Senior Year		SEMESTER	
Electives selected in consultation with student's advisor.		16-19	16-19

LABORATORY ANIMAL TECHNOLOGY The laboratory animal technologist is a member of a new profession with special training in the care and management of colonies of animals used in bio-medical research. Humane methods of handling, caging requirements, proper sanitation, nutrition and colony management are emphasized. Students are taught basic techniques in presurgical and postsurgical care, animal anesthesia, radiologic techniques, recordkeeping, experimental design, fiscal management and laboratory methods for analysis of blood, urine, fecal and tissue specimens. Site visits to animal facilities, seminars with guest lecturers, and small animal hospital experience provide further opportunities. Senior students are encouraged to explore in depth areas of special interest.

Graduates will normally serve a period of training prior to assignment to management responsibilities for animal colonies. With proper selection of electives and a good grade average (3 point plus), students can apply for admission to colleges of veterinary medicine. Employment opportunities are available with animal colonies associated with the pharmaceutical industry, medical, dental and veterinary schools, federal and state government agencies, diagnostic laboratories and institutions engaged in biological research.

The Freshman Year Same as Preveterinary Science Requirements

		1st	2nd
The Sophomore Year		SEMESTER	
Chem 131-132	Organic Chemistry	4	4
Microbiol 55	Intro Microbiology	4	—
Zool 101	Genetics	3	—
Speech 11	Public Speaking	—	3
	Electives	5-8	9-12

		1st	2nd
The Junior Year		SEMESTER	
Microbiol 201	Gen Biochem	4	—
An Path 107-108	Lab An Techniques	3	3
An Path 105	An Anatomy	3	—
An Path 106	Animal Diseases	—	3
An Sci 170	Gen Physiology	—	3
An Sci 246	Adv. Nutrition	—	3
	Electives	6-9	4-7

		1st	2nd
The Senior Year		SEMESTER	
An Path 217-218	Laboratory Animals	3	3
An Path 220	Laboratory Assignments	—	3

Radiol. Tech. 12

Radiologic Anatomy
Electives— 3
13-16 7-10

Department of Animal Sciences

Each student majoring in programs offered within this department shall successfully complete a minimum of eight semester courses in Animal Science, including at least five of advanced standing. Additional courses must be selected in consultation with the departmental advisers.

DAIRY TECHNOLOGY This option has been designed to provide the scientific, technical, and practical instruction necessary to prepare the graduate for the numerous positions available in the dairy and food science field. The students who elect to place greater emphasis on the scientific aspect of Dairy Technology will find that they are prepared to work in quality control, research laboratories, and to do graduate study in dairy and food chemistry or bacteriology. The student who desires to place greater emphasis on business and the social sciences may become qualified for numerous supervisory and management positions in the dairy and food industry.

BASIC ANIMAL SCIENCE This option has been designed specifically for those individuals who are interested in careers in industrial research and development or university positions. The students who elect this program will be provided with the strong science background that is necessary for advanced study in such areas as physiology, nutrition, genetics, and related biological fields.

ANIMAL TECHNOLOGY This option provides formal training in the theories and practices of the animal sciences with special emphasis on management and technical competence. It prepares the student for employment as a farm owner, manager, or field work with state and federal extension services, breed associations, hatcheries, farm organizations, and various commercial companies.

ANIMAL INDUSTRY This option is primarily for those students who are interested in business. It prepares them for supervisory and management positions in industries related to Animal Science, such as those involved with the processing and sales of dairy, meat and poultry products; feed and fertilizer companies; farm equipment and supply agencies; advertising and public relations; and other areas of public service.

Department of Botany

BOTANY Students in both the College of Agriculture and Home Economics and the College of Arts and Sciences may major in Botany. An undergraduate together with a departmental adviser selects a program suitable to provide a liberal education including broad areas of botanical and other biological sciences, as well as physical sciences. An apprenticeship program in environmental action enables an undergraduate to work closely with a faculty member who is concerned with environmental preservation or planning, and

gives the student the opportunity for decision making related to the Vermont environment. Students may choose to prepare themselves for careers that do not require education beyond the Bachelor's degree or they may prepare for graduate education leading to careers in botanical and biological fields such as medicine, dentistry, agricultural biology, biochemistry, environmental sciences, government service, secondary school teaching, and research.

Required courses: Mathematics 11, 12; Physics 5, 6; Chemistry 16 or preferably 131, 132; Biology 1, 2; Botany 101, 104, 105, and 109 or 160; two additional semester courses in Botany.

Six hours of modern foreign language are strongly recommended. Students may petition the department to substitute other courses for certain requirements in the planning of individual programs.

Department of Microbiology and Biochemistry

BIOCHEMICAL SCIENCE Contemporary biology increasingly demands knowledge of events at the molecular level. Students who plan a career of research or teaching in biology are well-advised to concentrate on the principles and methods of biochemistry during their undergraduate years. To this end the program in "Biochemical Science" provides a coordinated sequence of study in chemistry, biology, and biochemistry. Depending on the student's future plans and capability, three areas of concentration are possible: (1) *Cellular Biochemistry* which emphasizes the physiological and metabolic reactions of organisms; (2) *Molecular Biology* which focuses on the chemical and physical structures of subcellular particles; and (3) *Nutritional Biochemistry* which emphasizes the synthesis and utilization of nutrients. Specialization in one of these options normally commences in the Junior Year after completion of the Biological Sciences Core (pg. 72) Students are required to complete a minimum of 3 hours of physical chemistry (or 8 hours for the Molecular Biology option), 12 hours of biochemistry and three advanced biology courses, two of which would be in their specialty (e.g., Nutrition, Physiology, Genetics, etc.).

Department of Plant and Soil Science

PLANT AND SOIL SCIENCE Students interested in horticultural crops, agronomic crops, soils, or entomology as they relate to the production of food, feed, and fiber or to recreation and the environment may select courses of study specializing in horticultural crops, agronomic crops, soils, or entomology. This program provides a liberal education in the biological sciences as a basis for understanding the environment. The program is flexible and permits the student to concentrate in one or more area of specialization.

Each student majoring in Plant and Soil Science must take Principles of Plant Science, Introductory Soil Science, and two semesters of Seminar, in addition to the core courses required of all agricultural students. They are also required to take four courses in Plant and Soil Science at or above the 100 level. These are usually courses concerned with horticultural crops, agronomic crops, soils, or entomology depending on which area the student wishes to specialize in. Certain advanced courses in other departments may be substituted for

one or two of these 100 level courses with the consent of the student's advisor. Students may place their primary interest in either science or in agribusiness. Those interested in teaching and research careers or in graduate study usually select additional basic science courses such as botany, chemistry, mathematics, physics, zoology or in votex and education. Those interested in careers in industry, business, marketing, sales, or production usually select additional courses in marketing, economics, accounting, business, and management.

Department of Vocational Education and Technology

The VOTEC department offers two major programs, (1) Occupational and Extension Education and (2) Applied Technology and Agricultural Engineering, which provide an opportunity to choose from ten areas of professional specialization. The programs are flexible. Certain specializations may be completed either as (1) a major in this department, (2) a dual major when combined with other programs in the University, and/or (3) without having to attend the University campus on a full-time basis. Courses of general interest are available to students majoring in other programs in the University.

OCCUPATIONAL AND EXTENSION EDUCATION Five areas of specialization prepare students for teacher certification.

Teaching field minors may be combined with these specializations. Students should contact this department regarding requirements for admission into the University teacher education program.*

One specialization prepares students for educational responsibilities in governmental agencies, private organizations, business, or industry.

1. Diversified Occupations Education: Prepare to teach life relevant subjects to grade 9-12 mentally handicapped pupils when combined with a teaching field specialization in occupational or secondary education. Students in teacher education programs in the College of Education and in the Home Economics Department may receive initial certification in secondary special education. Individualized study and field experiences are included.

2. Health Occupations Education: Prepare to teach occupationally oriented subjects in grades 10-14. Available only to students who have completed a recognized training program in a health occupation and are licensed. A minimum of two years of experience in a health occupation is required before a degree is awarded.**

3. Industrial Education—Vocational: Prepare to teach a recognized trade or industrial subject in grades 10-12. A minimum of two years of acceptable ex-

* Teacher certification specializations are offered in cooperation with the College of Education. Selected programs have been approved under the Vermont State Department of Education's Program Approval Plan, and have reciprocity certification in selected states. Courses in the college of Education will be included in teacher certification specializations.

** Several paths lead either to a degree, teacher certification, or both. A degree may be earned on a full-time basis, or on a part-time basis while employed in industry or

perience in business, industry, or the military is required before a degree can be awarded.**

4. Natural Resource and Agribusiness Education: Prepare to teach grades 7-12 general and occupational subjects, and may concentrate their studies in one of the many agricultural or renewable natural resource subject areas. Field experiences in schools are provided during the sophomore or junior year, and the senior year. Professional courses include 152, 155, 251 and 282.

5. Technical Education: Prepare to teach post-high school technical and occupational subjects in one of a variety of technical areas by majoring in another department and completing this program of studies. Part of this specialization may be completed for graduate credit. Field experiences at the post high school level are provided in the senior year as part of the following professional courses: 152, 155, 251, and 282.

6. Extension Education: Prepare for educational responsibilities in government agencies, private organizations, business, or industry by majoring in another program in the University and complete this specialization concurrently. Field practicum experiences are provided. Professional courses include 112, 156, 253 and 295.

APPLIED TECHNOLOGY AND AGRICULTURAL ENGINEERING This program offers students a choice of two specializations leading to a Bachelor of Science degree and one which provides the first two years of a Bachelor of Science in Agricultural Engineering degree.

1. Agricultural Engineering Technology: Technical and practical instruction related to buildings, utilities, machinery, soil and water; including relevance to problems of environmental concern. Prepare for employment in agribusiness and public service. Courses include 102, 121, 131, 140, and 162.

2. Professional Agricultural Engineering—B.S.A.E.: The first two years of a professional engineering curriculum. The last two years of the professional program must be completed at an institution offering a Bachelor of Science in Agricultural Engineering degree. Vermont resident students in good standing may complete their studies at the University of Maine, under a special arrangement which allows them to pay the same tuition rate as Maine residents.

Prepare for professional engineering work in soil and water control, agricultural machinery and equipment, agricultural structures, the application of

teaching. Persons entering teaching directly from industry may earn teacher certification through the Transition Into Education (T.I.E.). Qualified individuals may start as non-degree students and seek admission to a degree program after satisfactorily completing specified courses.

Persons having two or more years of appropriate work or military experience may qualify for up to 30 credits by successfully completing trade competency exams administered by the department. Students with less than two years experience may qualify for the off-campus technical internship.

Qualified non-degree students seeking teacher certification will usually complete professional courses, 152, 153-154, 157, 158, 159 and 251.

electricity and refrigeration to agriculture, and rural water supply and sanitation. The graduate is also prepared for research and graduate study in agricultural engineering.***

3. Residential Technology: Technical and practical instruction related to residential construction, site selection, equipment, electricity, water supply and sewage disposal, including environmental and socio-economic considerations.

Prepare for employment in the housing industry and public service. Some areas of employment are: Banks, Farmers Home Administration, Federal Housing Administration, and the manufactured home industry.

Department of Forestry

Curricula in the Department of Forestry provide a liberal education in the humanities and sciences and a professional education in forestry or wildlife ecology. The programs are designed to prepare individuals for positions in forestry, in wildlife ecology, or for graduate study in the forest or wildlife sciences.

A minimum of 138 semester credit hours of prescribed and elective courses is required for graduation.

Forestry and Wildlife Ecology

		1st	2nd			1st	2nd
The Freshman Year		SEMESTER		The Sophomore Year		SEMESTER	
College Algebra, Math. 9 ¹		3	—	Elementary Statistics,			
Trigonometry, Math. 2		—	3	Math. 110		—	3
Engineering Graphics,				Silvics, For. 122		—	3
M.E. 1		—	2	Dendrology, For. 5		4	—
English		3	3	Plane Surveying, C.E. 12		4	—
Principles of Biology,				Principles of Economics,			
Biol. 1, 2		4	4	Econ. 11, 12		3	3
Introduction to Forestry,				Public Speaking, Speech 11		—	3
For. 1		2	—	Elementary Physics,			
Freshman Seminar,				Physics 5		4	—
For. 2		—	1	Forest Biometry I,			
Introductory Chemistry,				For. 144		—	3
Chem. 3		4	—	Electives		2-3	2-3
Electives		—	3-5				

Summer Field Program

Forest Biometry II, For. 140 ²	4
Forest Bioecology, For. 100 ²	4
Wildlife Biometrics, For. 170 ³	4

*** Freshman admission (at the Maine-resident tuition rate) to this curriculum at the University of Maine will be allowed for Vermont-resident students wishing to take all four years at one institution.

FORESTRY This program emphasizes the science and technique of coordinating the management of forest and wildland for forest products, water, wildlife, and recreation. Graduates may be employed by Federal and State agencies, by forest products and related industries, and by private consulting forestry firms.

A. Forestry Program

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
The Junior Year			The Senior Year		
Forest Fire Control, For. 132	—	2	Forest Economics, For. 151	3	—
Silviculture, For. 123	3	—	Forest Management, For. 136	—	3
Forest Entomology, For. 107	3	—	Forest Recreation, For. 135	3	—
Wood Technology, For. 162	—	3	Timber Harvesting, For. 163	3	—
Technical Reporting, VOTEX 174	3	—	Forest Pathology, For. 112	—	3
American Government, Pol. Sci. 21	3	—	Forest Policy and Ad- ministration, For. 153	3	—
Electives ⁴	4-6	11-13	Seminar, For. 282	—	1
			Principles Wildlife Mang't., For. 174	—	3
			Electives ⁴	4-6	6-8

WILDLIFE ECOLOGY This program emphasizes the science and technique of managing wildlife populations in forests and in other types of wildlands. Graduates may be employed principally by Federal and State agencies.

1. Qualified students may substitute Math. 11 or 13 for Math. 9 and 2.
2. For forestry majors only—courses in eight week program immediately following the second semester of the sophomore year.
3. For wildlife majors only—course in four week program immediately following the second semester of the junior year.
4. Restricted elective areas include—(a) a total of nine hours from two or more of the following: Arts, Humanities, Mathematics, Military Science, or Social Sciences; (b) one approved course in communications; (c) one approved course in earth sciences.

B. Wildlife Ecology Program

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
The Junior Year			The Senior Year		
Structure & Function, Zoo. 103, 104	4	4	Wildlife Diseases, An. Path. 110	—	3
Silviculture, For. 123	3	—	Wildlife Mang't I, For. 271	4	—
Systematics & Phylogeny, Bot. 109	3	—	Seminar, For. 282	—	1
Principles Wildlife Mang't., For. 174	—	3	American Gov't Pol. Sci. 21	3	—
Avian Biology, An. Sci. 158	—	4	Forest Entomology, P&SS 107	3	—
Game Mammals, For. 175	4	—	Technical Reporting, VOTEX 174	3	—
Environmental Zoology, Zoo. 102	—	4	Electives ⁴	3-5	12-14
Electives ⁴	2-4	1-3			

Department of Home Economics

The Department which concerns itself with man's physical, social, and psychological relationship to his environment offers nine programs, each leading to a bachelor of science degree, that prepare students for teaching or other professional positions presented in five major areas: Home Economics, Dietetics and Institutional Administration, Human Development, Early Childhood Programs and Services, and Social Welfare.

Home Economics Area

CLOTHING, TEXTILES AND DESIGN Prepares students for careers in merchandising, consumer research and counseling, fashion and textile designing, and promotional work in industry and the Extension Service. Professional requirements include courses in Clothing, Textiles and Design, Humanities, Social Sciences and Chemistry.

HOME ECONOMICS EDUCATION Prepares for a variety of teaching opportunities including the usual high school programs of homemaking-consumer education and wage earning plus newly developing areas of middle and elementary education in Living Arts, and Adult Teaching in the Extension Service. All students who plan to specialize in any phase of Education must make application to Teacher Education. Required courses are in the areas of the Humanities, Social Sciences, and Physical-Biological Sciences. A total of 120 credit hours of required and elective courses is needed for graduation.

HOUSING AND HOME MANAGEMENT Careers include work with utility companies or appliance dealers and a wide variety of opportunities in planning and management of housing and interiors. Students may prepare to work as consultants for urban renewal relocation, city planning, architectural and building firms. Promotional work may be found with consumer education and research, newspapers and magazines, radio and TV. Emphasis may be directed toward one of the following professional goals: Housing and Equipment, Housing and External Environment, Housing and Interior Design, Family Economics or Home Management. Professional requirements may be chosen from the Humanities, Social Sciences and Physical Sciences. Additional electives are needed to meet the 120 credit hours needed for graduation.

HUMAN NUTRITION AND FOOD Prepares students for positions in the fields of human nutrition, food testing, food promotion, food service management, and the hospitality industry. Course work is planned to give a strong background for graduate study which will qualify the student for positions in college teaching, Extension Service, research or public health. Course work is required from Human Nutrition and Food, the Humanities, Social Sciences and Physical-Biological Sciences.

Dietetics and Institutional Administration Area

DIETETICS This program is planned to meet academic requirements for membership in the American Dietetic Association. Those students interested in careers as administrative, therapeutic, clinic or public health dietitians, are

advised to plan on an internship after completing their undergraduate program. Professional requirements include courses in Human Nutrition and Food, the Humanities, Social Sciences and Physical-Biological Sciences. Additional electives are needed to meet the 120 credit hours needed for graduation.

HOSPITALITY INDUSTRY—FOOD SERVICE ADMINISTRATION Planned for the student who wishes to prepare for opportunities in Industrial and Institutional Food Service operations and in the Hospitality Industry. Professional requirements are chosen from Human Nutrition and Food, the Humanities, Social Sciences and Physical-Biological Sciences. Additional electives are needed to meet the 120 credit hours needed for graduation.

Human Development Area

HUMAN DEVELOPMENT Provides study opportunities and practical experiences that focus on the nature of the developmental process. The approach is interdisciplinary and ontogenetic, close ties being maintained with other programs within the Department and other departments in the University. A year of resident study at the Merrill-Palmer Institute in Detroit, Michigan, may be arranged. The student is prepared for work in agencies dealing with children and families, and for graduate studies. A minimum of 120 hours of course work in the Humanities, Social Sciences and Physical-Biological Sciences is required for graduation.

Early Childhood Programs and Services Area

EARLY CHILDHOOD PROGRAMS AND SERVICES Prepares men and women students for professional roles in a variety of early childhood programs. Candidates are involved in action programs throughout the four years in the laboratory early childhood center and in the surrounding communities. The curriculum is individualized as much as possible to adapt to student goals.

Social Welfare Area

SOCIAL WELFARE Provides education for social work practice based on a liberal education in the Social Sciences and Humanities. Career opportunities in the field of social welfare are explored. The student, in consultation with his Advisor, selects elective courses which will give him the opportunity to develop his individual interests. A minimum of 120 credit hours of prescribed and elective courses is required for graduation.

V The College of Arts and Sciences

The College of Arts and Sciences aims to provide the opportunity for men and women to acquaint themselves with man and his environment: the natural, social and cultural environment and its relationship to man's intellectual and creative achievements; to provide an atmosphere of free inquiry in order to be able to perceive the kinds of alternatives available to man with respect to the problems, challenges and opportunities of life by means of continuous probing, weighing and critical evaluation prior to—but not necessarily in lieu of—choosing courses of thought and action while at the same time recognizing the increasing sense of humility that such learning imposes; above all, to deal with man as man and only secondarily with man as a job description.

The Liberal Arts Curriculum

The curriculum in liberal arts, leading to the degree of Bachelor of Arts, offers instruction in language, literature, philosophy, religion, the fine arts, the social sciences, the physical and biological sciences and mathematics.

Every candidate for this degree must fulfill the requirements described in sections I and II below, and present a total of 120 semester hours of credit, plus credit in required courses in physical education. At least 75 of the minimum 120 credit hours must be in subjects outside the major discipline.

The Studies Committee of the College will rule upon petitions for exceptions to the College regulations.

The College expects entering students to be able to write correct, clear and effective English, and no student unable to do so shall obtain the B.A. degree.

I. Required for all students

In addition to the two semesters of physical education required of all students by the University, the following distribution requirements must be met: Each student shall present nine semester courses (3 credits, or more each) by choosing *three courses from each of any three of the following categories*:

A. LANGUAGE and LITERATURE

- | | | |
|---------|---------------------------|----------|
| English | *Hebrew | *Russian |
| *French | *Italian | *Spanish |
| *German | *Latin | |
| *Greek | Literature in translation | |

No more than two of the three required courses may be chosen from any

* Intermediate level or above

one discipline. Students may not fulfill the requirement without offering a foreign language at the intermediate level or above.

B. FINE ARTS AND PHILOSOPHY

art	music	philosophy
drama	speech	religion

No more than two of the three required courses may be chosen from any one discipline.

C. SOCIAL SCIENCES

anthropology	history
economics	political science
geography	psychology
	sociology

No more than two of the three required courses may be chosen from any one discipline.

D. SCIENCES AND MATHEMATICS

biology	geology
botany	physics
chemistry	zoology
	mathematics

No more than two of the three required courses may be chosen from any one discipline. (Biology, botany and zoology are considered one discipline)

NOTE: Linguistics 101, 102 may be considered as meeting the distribution requirements of category A or B or C at the student's option.

MAJOR FIELD Each student, in consultation with his adviser, must choose a major field during his sophomore year. The specific courses making up the field, as well as the student's entire program for the last two years, are chosen in consultation with the chairman of the department in which the major part of the work is to be taken and must have his approval. The following minimal requirements must be met.

1. The field must be a well integrated whole, adapted to the student's special interest.
2. It must include a minimum of 36 semester hours, at least 18 of which must be in the major discipline. Concentration requirements, including courses and necessary prerequisites may not exceed 60 semester hours, not more than 45 of which may be required in the major discipline.
3. Courses taken to fulfill distribution requirements may also be counted toward the major credit requirements.

INDIVIDUAL DESIGN MAJOR For those students whose needs and interests are not met by the major programs currently offered in the College, there exists the option for the student to initiate a non-departmental major chosen from among the various offerings in the College and tailored to their individual needs. The program must be sponsored by a faculty member and approved by the College Honors and Individual Studies Committee and presented in the student's sophomore year.

II. Specific Departmental Requirements for Majors

ANTHROPOLOGY Anthropology 21 and two of the following three: 24, 26, 50; and one of 228, 229; and 225 and 290 (normally taken in the senior year; four other advanced courses.)

AREA AND INTERNATIONAL STUDIES Requirements for concentration include the general distribution requirements in the College of Arts and Sciences, the foreign language of the selected area (Chinese or Japanese, French, Spanish, Russian or Serbo-Croatian), usually through the intermediate level; several options of courses in the social sciences and humanities, related to the selected area; and specialized area courses, reading and research, college honors, and area seminars, based on team teaching and supervised research.

ART 36 hours in Art with a minimum of 9 hours each in art history and studio, including 1, 2, 5, 6 and an additional 12 hours in one of these areas including a semester of seminar or independent studies in the senior year; plus 6 hours at the advanced level in each of two related subjects chosen from different distribution fields.

BOTANY Mathematics, 11, 12; Physics 5, 6; Chemistry 16 or preferably 131, 132; Biology 1, 2; Botany 101, 104, 105, and 109 or 160, and two additional semester courses in Botany. Six credits of modern foreign language are strongly recommended. Students may petition the department to substitute other courses for certain requirements in the planning of individual programs.

CHEMISTRY Mathematics 13, 14 and 123 (or equivalent); 5, 6 (or equivalent); physics; Chemistry 11-12 (or 1, 2 and 123), 131, 132, 134, 141, 142, 201, 202 and 212. No advanced related course is required. These are the minimum requirements for a concentration in chemistry. This program does not provide an adequate background for graduate study nor for a professional career in chemistry. Those planning for graduate school or a career in chemistry should arrange to take as many of the following as convenient: Chemistry 213, at least six additional hours of advanced level chemistry courses, which may include Chemistry 197, 198, Math 271, and German through German 12. A student following these recommendations in their entirety will acquire 47 hours in chemistry and therefore will require 122 hours for graduation.

COMMUNICATION AND THEATRE Students may choose one of four options: Communication and public address: 1, 11, five advanced level courses, two additional courses in the Department; plus nine hours of related courses.

Mass communication: 1, 63, 162, 263, one from (11, 14, 31, 41, 81); one from (161, 164, 265), three additional advanced level courses in the Department; plus nine hours of related courses.

Speech pathology-audiology: one from (11, 14, 31, 41, 81), 74, 101, 270, 271 or 272, 273, 281, one additional course in the Department; plus eleven hours of related courses.

Theatre: 39, eight additional courses in the Department; four of which must be at the advanced level; and five of which must be in Theatre; plus nine hours of related courses.

ECONOMICS Twenty-seven hours in Economics including 11, 12, 186, 188, 190, 285 or 295 and three courses from the Economics list which are numbered 100- or above. In addition, 12 credits chosen from among the following disciplines: anthropology, geography, history, mathematics, philosophy, political science, psychology, religion, sociology.

ENGLISH Twenty-four hours of advanced courses distributed according to departmental group requirements; satisfaction of the Group A College requirement; 12 hours (6 in courses numbered 100 or above) in a related field; students are encouraged to take advanced courses in history and classical and modern foreign languages and literature.

GEOGRAPHY Twenty-seven hours in Geography (including Geography 11, 12, 71, 281, an additional six semester hours at the 200- level and nine other semester hours in Geography); four semester courses in approved related fields.

GEOLOGY Twenty-four hours in Geology, including six hours at the 200 level. Twelve hours in Physical Science, Biological Science, Mathematics, or Engineering. (Field experience recommended).

GERMAN Eight semester courses of advanced level including 101, 102 plus the senior seminar; four semester courses of English; two semester courses of European history to be selected from 11, 12, 13, 233, 234, 235, 236; an advanced related course to be selected in consultation with the department.

GREEK 11, 12 and fourteen additional hours in courses numbered above 100, including 111, 112. Either 151 or 153 may be included, but not both.

HISTORY Twenty-seven hours (12 at the 100 level or above, including at least 6 at the 200 level), 6 hours in history outside the area of the United States; one foreign language through the intermediate level or a year of statistics and quantitative methods; 12 hours in another discipline approved by the department or within one of the areas taught in area studies. History 3 is recommended for majors. Every history major must submit to the department an acceptable research paper in history (which may have been done in one of his courses) by the end of his first senior semester.

LATIN Twenty-three hours in courses, numbered above 100 including 111, 112. Either 152 or 154 may be included, but not both. Courses in Greek are strongly recommended, particularly to those who contemplate graduate work in classics.

MATHEMATICS Thirty-six semester hours of courses numbered 11 or higher, including 102, 124 and fifteen additional semester hours in courses numbered 200 or above.

MUSIC 1, 2, 5-6, 105-106, 221, 222 and six hours of performance study including piano; six hours in another discipline as approved by the department. Students who wish to meet accreditation requirements of the

National Association of Schools of Music will also complete one of the following combinations:

- (a) 203, 205 and four advanced courses in music literature.
- (b) 203, 205, 208, 215 and two advanced courses in music literature.
- (c) 208, advanced course in music literature and twelve additional hours of performance study.

A senior recital is required of all students majoring in music. One foreign language through the intermediate level is required of students on combinations (a) or (b).

PHILOSOPHY Twenty-four hours including 3, another course under 100, 101, 102, 197 or 198 in the junior year, and three 200 level courses, two of which must be in the following areas: theory of knowledge, theory of value and metaphysics. An additional twelve hours in a related discipline, or disciplines, is required. Students considering graduate work in philosophy are urged to study a foreign language.

PHYSICS Thirty-six hours of physics and related courses normally including 17, 18, 27, 128 and necessarily including 211, 213 and 271 or 265 plus six hours of laboratory in physics at the junior-senior level; mathematics through 121 or 123 and either one more advanced course in mathematics or Physics 216. An additional laboratory science and a reading knowledge of French, German or Russian are strongly recommended.

POLITICAL SCIENCE Twenty-seven hours including nine hours selected from among the "core courses" (13, 21, 51, 71, 81) and at least six hours in courses numbered above 200; twelve hours (including six hours of advanced courses) in a related discipline.

PSYCHOLOGY Twenty-six hours including 1, 5, 109, 110, 123, and two courses numbered above 200 (225-226 is considered a single course).

RELIGION Twenty-seven hours in Religion, including two courses chosen from among 101, 112, 122; one course from the 140-159 range; one course from 160-179 range; 201; plus one other course from the offerings listed above 180; plus nine hours in a related discipline.

ROMANCE LANGUAGES Twenty-four hours of advanced level courses in French or Spanish, of which at least twelve must be in literature and at least twelve must be in courses numbered above 200. In addition, the senior seminar is required of all majors. Related area: a minimum of twelve hours of courses from another department or departments, chosen in consultation with departmental major advisers and specifically approved by them.

SOCIOLOGY A minimum of ten courses (30 credits) in sociology and of two courses (6 credits) in the related fields of anthropology, economics, geography, history, political science, or psychology. The courses in sociology must include 22, 250, 251, and 255.

ZOOLOGY Mathematics 11 or 25; Physics 5, 6; Chemistry 1-2 or 11-12 to be

taken the freshman year if possible; Biology 1, 2; Zoology 101, 102, 103, 104; plus seven hours chosen from 105, and 200-level courses.

Special Provisions Concerning Credit

Courses offered in other colleges or divisions of the University of Vermont by departments which offer a major in Arts and Sciences (as approved by the Faculty of Arts and Sciences) receive full credit toward the B.A. degree. Courses offered in other colleges or divisions of the University by departments which do not offer a major in the College of Arts and Sciences may be taken without any limitation by Arts and Sciences students, but *only 24 semester hours of such courses may be applied to the minimum 120 credits required for the B.A. degree.* (At the present time, majors in departments outside the College are available in Botany, Chemistry, and Mathematics).

Courses in Economics and Business Administration Acceptable Toward the B.A. Degree

Economics 3, 11, 12, 13, 14, 15, 16, 101, 103, 104, 105, 121, 141, 142, 181, 183, 186, 188, 190, 216, 238, 240, 241, 256, 258, 267, 277, 285, 290, 291, 292, 295, 297, 298.

The Business Administration Curriculum

The Department of Economics and Business Administration offers two curricula: one leads to a Bachelor of Arts with a major in Economics, the other to a Bachelor of Science in Business Administration.

The business administration curriculum is intended to provide a sound basic training in the various phases of business activity. The several areas of concentration enable students to emphasize such specialized studies as accounting, banking, industrial management, and marketing management. The Department of Economics and Business Administration cooperates with the Department of Mechanical Engineering in offering courses in the Management Engineering Curriculum. This curriculum is administered by the Department of Mechanical Engineering and is described in the section on engineering curricula.

The accounting option is registered with the University of the State of New York, The State Education Department, in Albany, N.Y. Students completing the requirements of the accounting option will thus be eligible for admission to the New York State licensing examination in Certified Public Accountancy.

A minimum of 120 approved semester hours is required for the Bachelor of Science in Business Administration degree plus required courses in physical education. Students must take Principles of Economics (11, 12) and Principles of Accounting (13, 14) in the first two years.

After the first two years a student may elect various concentrations of courses to emphasize selected aspects of business administration. The following courses, however, are required of all candidates for the Bachelor of Science in Business Administration degree:

	Hours
Principles of Marketing, BA 121	3
Industrial Management, BA 143	3

Elementary Statistics, BA 188	3
Macroeconomic Theory, Econ. 190 ¹	3
Introduction to Integrated Data Processing and Computers, BA 160	3

In addition to the courses listed above, a student must take a minimum of 12 hours in his chosen area of concentration. Courses by areas of concentration are listed below:

Finance

	Hours
Money and Banking, Econ. 101	3
Economics of Taxation, Econ. 103	3
Economics of State and Local Taxation, Econ. 104	3
International Trade and Finance, Econ. 105	3
Basic Federal Taxes, BA 164	3
Principles of Investment, BA 206	3
Corporate Finance, BA 207	3

1. Accounting majors will substitute BA 101, Money and Banking.

Marketing Management and Sales Promotion

	Hours
Problems in Marketing, BA 122	3
Sales Management and Promotion, BA 130	3
Fundamentals of Advertising, BA 132	3
Current Marketing Developments, BA 228	3
Marketing Management, BA 229	3
Personal Selling in the Economy, BA 123	3
Research Methods in Marketing, BA 127	3

Industrial Management

	Hours
Labor Economics, Econ. 141	3
Collective Bargaining, Econ. 142	3
Personnel Administration, BA 251	3
Methods Engineering, M.E. 175	3
Plant Organization, M.E. 176	4
Scientific Management and Labor, BA 254	3
Executive Decision-Making, BA 252	3
Cost Accounting, BA 272	3

Accounting

All Accounting majors are required to take the following courses:

	Hours
Business Law, BA 9, 10	6
Intermediate Accounting, BA 161-162	6
Cost Accounting, BA 272	3
Advanced Accounting, BA 266	3
Basic Federal Taxes, BA 164	3
Auditing, BA 271	3
Corporate Finance, BA 207	3

Preprofessional Preparation

Students who plan to enter professional colleges requiring previous col-

legiate preparation will find the variety of courses offered in the College of Arts and Sciences and the freedom of election in that college is such that all the requirements for any professional school may be met. Many students will desire so to direct their four-year undergraduate courses as to provide, in addition to a sound general education, appropriate preprofessional training for later work in the medical sciences, law, or theology.

Special advising is available in the College for students preparing for careers in education, journalism, law, and medical sciences.

JOURNALISM Admission to schools of journalism is generally open to academically qualified students who hold the Bachelor of Arts degree with concentration in any discipline. Interested students should take a broad program in the liberal arts, including work in the social sciences, in mass communication, and in English.

LAW American law schools, as a rule, require graduation from a four-year college with a Bachelor's degree prior to admission. There is no prescribed curriculum which is requisite for admission, but the student is advised to develop a command of the English language as well as a comprehension of American politics, social, and economic institutions. For further details, kindly consult Professor L. J. Gould, Department of Political Science.

THEOLOGY Graduation from a four-year college is prerequisite for admission to most theological seminaries. Although no prescribed curriculum is demanded as preparation for such professional schools, the student is advised to elect substantially from the departments of languages (particularly classics), history, philosophy and religion, psychology, and social studies.

OPTOMETRY The requirements for admission to schools of optometry vary, but typically they include courses in English, mathematics, physics, chemistry and zoology with a minimum of two years of college work.

PHARMACY Under the Regional Plan (page 35) Vermont residents may prepare for pharmacy school at Connecticut or Rhode Island. This is a five-year program with two years of preprofessional work which includes English, mathematics, botany, chemistry, zoology, physics, social science, a course in fine arts, and orientation to pharmacy.

MEDICINE AND DENTISTRY The prevailing requirements for admission to an accredited medical college include a minimum of three years of undergraduate work, but most institutions recommend four years. It is strongly urged that a student desiring to enter medical college should during his sophomore year consult catalogues of colleges to which he expects to apply, and arrange to include in his program courses required by those schools.

Each student, in consultation with his adviser, plans a four-year program of courses which will fulfill the requirements for a Bachelor's degree. To meet the minimum requirements of most medical colleges, the program should include the following:

Mathematics, one of the following options:

- (a) Mathematics 11, 12 (recommended for able students)
- (b) Mathematics 11 (adequate)
- (c) Mathematics, 9, 11 or 9, 2 (adequate)
- (d) Mathematics, 7, 8 (acceptable but not recommended for most students)

Chemistry, two years minimum, *with laboratory*

Chemistry 1-2 or 11-12 (Chemistry 1-2 preferred)

Chemistry 131, 132 (required)

Chemistry 123 (required by many medical colleges)

Physics, one year minimum, *with laboratory*

Physics, 5, 6 or 17, 18, 27 (Physics 5, 6 preferred)

Biology, one year minimum, *with laboratory*

Biology 1, 2

Zoology 101 or 103

Students who enter an accredited medical college after three years (90 hours) of undergraduate work may, on application and after completing one year of medical study, qualify as candidates for a Bachelor of Science degree.

The requirements for admission to colleges of dentistry vary, but in all cases include at least two years of college work. In general, the minimum requirements given above should be used in planning a program leading to entrance into a dental school. A student should consult catalogues of the dental colleges to which he expects to apply in order to make certain all requirements are met.

SECONDARY TEACHING Students in the College of Arts and Sciences may, upon application to the Dean of Education, be accepted into the teacher training program for secondary education. Application should be made before the end of the sophomore year. The prescribed courses in education, including student teaching, can count as electives in the Arts and Sciences program (utilizing the right to count 14 hours in non-Arts and Science courses plus certain education courses that can be counted without restriction). Students completing this program are eligible for Secondary Teacher's Certification.

College Honors

The honors program at both the junior and senior level is designed for the superior student with unusual initiative and intellectual curiosity, and provides an opportunity to pursue a special project without the restrictions of classroom routine. Such a student enters a program of reading, research, or creation under the direction of the department of his choice. A student may take honors in either or both years.

A student in the College of Arts and Sciences who, at the end of his junior year, has an average of 3.00 or above for the work of the sophomore and junior years may become an applicant for college honors in a particular subject. His program for the senior year must be approved not later than the end of the junior year by the department in which honors are sought and by the Committee on Honors, and he must present a satisfactory written report and pass an oral examination on the field of special study.

A program called junior honors, which may be considered introductory to but distinct from college honors, is available to juniors who have a sophomore average of 3.00 or above and who have the permission of their department

chairmen. The program for each junior honors candidate will be determined by the department concerned.

Departmental Honors

A senior whose overall average is 2.50 or above, or who has been specially recommended by the department in which he is concentrating, is eligible to take a comprehensive examination. Upon successfully completing the examination he will be granted his degree "with Departmental Honors." Some departments have instituted seminars or other programs designed to help the student gain the requisite breadth and depth of knowledge.

The Center for Area Studies

The Center for Area and International Studies is an inter-departmental activity conducted by the Committee on Area Studies. The chairman of the Committee serves as Director of the Center.

The purposes of the Center are to encourage and coordinate interdisciplinary and comparative study and research for selected foreign areas. The Center sponsors also interdisciplinary seminars and guest lectures.

The Center for Area Studies administers the program of concentration in Area Studies and offers the B.A. degree in the College of Arts and Sciences, based on the successful completion of courses in several academic disciplines with concentration in one of the four foreign areas: Asia, Canada, Latin America, and Russia and Eastern Europe. For the general requirements for concentration in Area Studies see under the Liberal Arts curriculum.

Undergraduates interested in taking Area Studies should consult as early as possible in their college careers, the Chairman of the Committee on Area Studies and/or the directors of the individual programs. The Center is located at 479 Main Street.

Undergraduates who select to major in Area Studies usually accumulate sufficient credits enabling them to also fulfill departmental requirements in one of the social sciences, humanities, or foreign languages.

Study Abroad

The Vermont Overseas Study Program at the University of Nice in France provides a year of study abroad for a selected group of undergraduates from the University of Vermont and from other Vermont colleges and universities. Intended primarily for students concentrating in French, the program is also open to qualified students from other fields, such as the fine arts or the social sciences. Student selection will be based on the following criteria:

1. Sophomore, junior, or senior class standing with a minimum grade point average of 2.0 (C).

2. A working knowledge of French.
3. An interest in and potential for capitalizing on a year of study abroad.
4. A sound educational program.
5. Creditable personal qualifications.

Upon the successful completion of his work, the student receives appropriate credit (usually thirty hours) toward his degree. For further information about the Vermont Overseas Study Program, an interested student should speak to his academic dean or to the director of the program.

A student wishing to attend a foreign university on his own or under another program and receive transfer credit should consult with his academic dean and obtain approval, in advance, of his plans. In general, to gain approval a student will be expected to have completed two full years of work, to have an average of at least 2.5, to have a valid academic objective, and to have a good working knowledge of the language of the country to which he proposes to go.

The University is a member of the Intercollegiate Center for Classical Studies in Rome. Properly qualified students may attend one or two semesters at the Center and receive full credit. For further information consult with the chairman of the Department of Classics.

The Government Research Center

The Government Research Center, established in 1950 as the Government Clearing House, provides research and informational services for students, state and local officials, members of civic groups, and the public. Activities include the following: developing opportunities for students to become acquainted with, and to gain practical experience in, the operation of government; maintaining liaison with state and local officials relative to the use of University resources in the study of problems in state and local government; operating a public affairs research center, conducting research projects, and publishing studies in state and local government; and preparing background materials for conferences on public questions.

Many of the activities of the Government Research Center are sponsored in cooperation with state officials, local officials, or civic groups. The annual Listers' Schools are sponsored jointly with the Governor and the Vermont State Tax Department. Many state and local officers participate in the series of one-day Town Officers Educational Conferences, which originated in the late 1930s and which are held annually in several locations throughout Vermont. A two-day conference on citizenship, in which high school juniors, high school faculty members and administrators, and University personnel participate, has become an annual event, with the cooperation of the State Department of Education and various educational associations.

A Public Affairs Library collection is maintained as a memorial to the late James P. Taylor, whose effort to expand citizen interest in effective government is well known throughout the State. The Government Research Center also sponsors the annual Taylor Town Report Contest in Vermont and cooperates with the New England Council relative to the region-wide contest.

The Government Research Center is a program of the Department of Political Science.

The Experimental Program

The Experimental Program of the College of Arts and Sciences is based on the "living-learning" residential college concept of decentralized university work. Students who are selected for the program live in a designated dormitory complex (if they choose to live on campus) and take a special instructional program based on small seminar groups, graded on a pass-fail basis. Upon successful completion of two years in the Experimental Program, students are awarded 60 credit hours and the distribution requirements in Arts and Sciences are considered satisfied. Students then take regular Arts and Sciences courses and complete departmental majors during their junior and senior years. However, they may continue to reside with the Experimental Program as upperclass participants. Specific departmental major requirements and advanced course prerequisites must still be met. (Students should consult their advisers as to the Experimental Program work that may be counted toward departmental major requirements and advanced course prerequisites.)

Students are admitted to the Experimental Program by invitation only, on the basis of a random sample of the entering freshman class in the College of Arts and Sciences. Invited students are not obliged to enroll in the Program, and those who do enroll may transfer to the regular program at the end of any semester, with appropriate credit being decided by the faculty of the Program. However, it is not possible for a student to transfer into the Experimental Program once he has begun work in the regular program.

Students in the Experimental Program normally take three seminars together with one conventional course in the regular program. All students have an adviser who is teaching in the program, and individual tutorials are occasionally provided in the case of special interests and preparation. (For seminar offerings, see under courses of instruction.)

V The College of Education

The College of Education offers four-year curricula leading to the following degrees: Bachelor of Science in Education and the Bachelor of Science in Music Education.

Undergraduate programs are offered in:

- Art Education—Gr. K-12
- Elementary Education—Gr. K-6
- Music Education—Gr. K-12
- Physical Education—Gr. K-12
- Secondary Education—Gr. 7-12

These curricula are designed to prepare teachers for the kindergarten-elementary level, junior high schools, and assignments calling for subject specialities in elementary, secondary, and twelve-grade situations. Programs are composed of general education, professional education, and professional laboratory experiences.

The College of Education is developing an experimental approach in the area of reading-language arts, early childhood and special education. These special programs will be available for selection by students during their sophomore year. Upon completion of their sophomore year, they may enter one of these two year specialized programs for the last two years of their undergraduate career. Further information will be provided during your first year on campus. Other programs such as open classroom, and middle school preparation are also in the discussion stage.

The College of Agriculture and Home Economics offers the following teacher education programs in cooperation with the College of Education:

Home Economics Education, with specializations in:

- Homemaking and Consumer Education—Grades K-12
- Wage Earning Home Economics Education—Grades 10-12
- Pre-kindergarten Education
- Family Life Education

Occupational Education, with specializations in:

- Diversified Occupations Education—Special Education Grades 9-12
- Health Occupations Education—Grades 10-12
- Industrial Education, Vocational—Grades 10-12

Industrial Education, Industrial Arts—Grades 7-12

Natural Resources and Agribusiness Education—Grades 7-12

Technical Education—Grades 13-14

For further information refer to the sections in this bulletin describing the College of Agriculture and Home Economics, Home Economics Department, and Vocational Education and Technology Department.

General Education Requirements

Each student in the College of Education is required to select a minimum of sixty credit hours from the following five general areas, with the restriction that at least one course must be selected from each area. General education courses required for certification such as English and Social Science or the College requirement of two semesters of Physical Education activities may be used to satisfy the general education requirement in that area. Students may also apply required courses in their Major and Minor, Broad Field, or Area of Concentration, to meet requirements in general education.

I. Arts and Letters

- a. Art
- b. Classics
- c. English
- d. Music
- e. Speech and Drama

II. Science and Mathematics

- a. Biology
- b. Botany
- c. Chemistry
- d. Geology
- e. Mathematics
- f. Physics
- g. Statistics
- h. Zoology

III. Social Sciences

- a. Economics
- b. Geography
- c. History
- d. Political Science
- e. Psychology
- f. Sociology & Anthropology

IV. Humanities

- a. Foreign Languages
- b. Philosophy
- c. Religion

V. Health or Physical Education

- a. Health Education
- b. P. E. Methods
- c. Selected Activities

Personal Component

Students in each teacher education program, beginning with the Class of 1974 (with the exception of those in Music Education), are also requested to include in their program the Personal Component (Ed. 198). The personal component offers students an opportunity to pursue an activity under self-direction. Each student is required to state the objectives for his study and to make a contractual arrangement with his personal component adviser to fulfill the terms of the contract. Multiple contracts and renewal contracts are possible. Options such as education colloquia, community action experience, seminars and discussion groups, individual counseling, group counseling, and others will be provided during the four years.

Admission and Accreditation

The College of Education has the responsibility for maintenance of standards approved by the National Council for the Accreditation of

Teacher Education (NCATE). Although initial acceptance to the University freshman year may be as a student in the College of Education, official admission to the College is made during the sophomore year. During the freshman and sophomore years special tests in communication skills and other screening measures are administered. Students must also meet personal, academic, and professional criteria established for teacher education candidates. This admission procedure is in accordance with the College's standards as approved by the National Council for the Accreditation of Teacher Education.

All teacher education candidates are expected to complete admission procedures before the beginning of the junior year in order to fulfill degree requirements. Throughout one's program a Coordinator of Educational Career Planning, whose office is in 404 Waterman Building, will assist students in career planning and placement.

The programs to be described are the programs through which the UVM College of Education achieves accreditation by the National Council for Accreditation of Teacher Education and the Vermont State Department of Education Program Approval Plan. Students completing an NCATE accredited program are qualified to receive certification in most states. Those completing a program evaluated through the Vermont State Department of Education's Program Approval Plan will have reciprocity certification in neighboring states. Further information may be obtained from the Student Information Service Center, 306 Waterman Building.

Art Education

The program in Art Education qualifies candidates to teach art in grades K through 12. Students fulfill general education requirements and complete 42 hours in professional art education and required education courses, 48 hours in studio art, art history or related subjects, and the Personal Component (Ed. 198). Graduates satisfy College of Education requirements for teacher certification and College of Arts and Sciences requirements for an Art Major. The program allows sufficient additional advanced courses as recommended by the Art Department for admittance to Graduate School.

Students must be enrolled in the College of Education and application to the Art Education program must be made before the end of the sophomore year.

A typical program is as follows:

	1st SEMESTER	2nd SEMESTER		1st SEMESTER	2nd SEMESTER
Freshman Year			Sophomore Year		
English (select from 1-18)	3	or 3	English (select from 21-198)	3	or 3
Speech 11 or 31 (81 with permission)	3	or 3	Psychology 1	3	or 3
Foundations of Education	3	or 3	Participation (Ed. 15)	2	or 2
Social Science	3	or 3	Design (3 & 4 or equivalent)	3	3
One elective from the Science & Math. areas	3	or 3	Encounter with Art (Art 140-141)	3	3
One elective from the Humanities area	3	or 3	Studio Electives	—	—
Physical Education	1	1	Related Electives	—	—
Design (1 and 2)	3	3			
Art History (5 and 6)	3	3			

THE COLLEGE OF EDUCATION

	1st	2nd		1st	2nd
Junior Year	SEMESTER		Senior Year	SEMESTER	
Learning & Human Development (Ed. 145-146)	3	3	History of Educ. Thought	3	or 3
Curriculum & Practice in Art Ed. (Art 177)	3	—	Special Problems in Art Educ. (Art 184)	3	or 3
Issues in Art Ed. (Art 183)	3	—	Secondary Methods & Procedures (Ed. 178)	—	3
Studio Electives	—	—	Student Teaching (Ed. 181)	—	8
Related Electives	—	—	Studio Seminar (Art 281)	3	—
			Studio Electives	—	—
			Related Activities	—	—

Personal Component (Ed. 198)—7 hrs.

A minimum of 124 approved semester hours is required for the degree.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education offices.

Elementary Education

The elementary education program is intended to prepare teachers for the elementary schools Grades K through 6. The Bachelor of Science in Education is awarded upon satisfactory completion of an approved program.

The elementary education curriculum includes a general component of a minimum of sixty credits selected from the following five academic areas: Arts and Letters, Science and Mathematics, Social Sciences, Humanities, and Health and Physical Education (two semesters of Physical Education activities are required). The student may use electives during the four years to build an academic area of concentration of twenty-four to thirty-three credits. Specific information about academic majors or general education requirements may be obtained from advisers or from the Student Information Services Center, 306 Waterman Building. In addition, the program includes a planned sequence of professional courses, laboratory experiences, and the Personal Component (Ed. 198).

The professional program begins with the introduction of the student to education as a field of study during his freshman year. Each student is made aware of the social foundations and relationships of education, introduced to the extensive resources available to him for learning about the field in depth, and impressed with the developmental need for his delving into the literature and research as a basis for making critical judgments concerning education. The characteristics of teaching as a profession are also stressed.

In the sophomore year, the students are offered field experiences with children's groups in the community. These experiences serve the dual purpose of giving first-hand information about children and of providing opportunity for determining the satisfaction which association with children of different age levels brings to the student.

The junior year emphasizes professional course work and special content courses for elementary teaching. Professional courses include classroom observation and participation in local elementary schools.

The senior year continues the professional methods courses and includes

eight full weeks of student teaching in the elementary schools of the Greater Burlington area and adjacent communities.

In addition to the above academic and professional requirements, the following courses are recommended to meet specific state and national certification requirements, in elementary education: six credits of English (selected from Eng. 1-198), Human Geography (Geog. 11), Music Methods & Literature (Ed. 111 & Music 112), American History (History 23 & 24), Fundamental Concepts of Elementary School Mathematics (Math 125-126), and American Government (Political Science 21).

Applications for all field experiences must be made one semester in advance of assignments, and the student must assume responsibility for meeting deadlines. Information about application and assignment procedures may be obtained from the Coordinator of Professional Laboratory Experiences, 412 Waterman Building.

A grade of at least C must be attained in the one required course in each of the five general education areas, in the Area of Concentration if one is selected, and in minimum required credits in professional education courses.

A typical program is as follows:

Freshman Year		1st 2nd SEMESTER		Sophomore Year		1st 2nd SEMESTER	
Foundations of Education (Ed. 2)		3	or 3	Child and Community (Ed. 3 or 4)		1	or 1
Speech 11 or 31 (81 with permission)		3	or 3	*Music Methods and Literature (Ed. 111 and Music 10)		3	& 3
*English (select from 1-18)		3	or 3	*Fundamental Concepts of Elementary School Mathematics (Math 125 & 126)		3	& 3
*Human Geography (Geog. 11)		3	or 3	*American History (Hist. 23 & 24)		3	& 3
Personal Component (Ed. 198)		1	& 1	*English (select from 21-198)		3	or 3
Physical Education		1	& 1	Personal Component (Ed. 198)		1	& 1
General Electives and/or approved electives in Area of Concentration				General Education electives and/or approved electives in Area of Concentration			
Junior Year		1st 2nd SEMESTER		Language Arts and Reading (Ed. 121)		— 3	
Encounter with Art I (Ed. 140)		3	—	*American Political System (Pol. Sci. 21)		3	or 3
Learning and Human Development (Ed. 145-146)		3	& 3	Personal Component (Ed. 198)		1	& 1
Language Arts and Children's Literature (Ed. 134)		3	—	General Education Electives and/or approved electives in Area of Concentration			
Teaching Science and Social Studies (Ed. 144)		—	3				

* Recommended to meet specific state and national certification requirements.

Senior Year	1st 2nd SEMESTER		Student Teaching (Ed. 181)	8 —
			Personal Component (Ed. 198)	1 or 1
Teaching Mathematics and Critical Thinking (Ed. 160)	3	—	General Education	
Health and Physical Education for the Elementary School (P.E. 100 and 116)	2	& 2	electives and/or approved electives in Area of Concentration	
History of Educational Thought (Ed. 190)	—	3		

A minimum of 127 approved semester hours is required for the degree.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education offices.

Secondary Education

The secondary education program is intended to prepare teachers for junior and senior high schools in Vermont and other states. The Bachelor of Science degree is awarded upon satisfactory completion of an approved program.

The secondary education curriculum includes a general component of a minimum of sixty credits selected from the following five academic areas: Arts and Letters, Science and Mathematics, Social Sciences, Humanities, and Health and Physical Education (two semesters of Physical Education activities are required). The student must use electives during the four years to build major and minor fields of study or a Broad Field major. Students may apply required courses in their majors and minors or Broad Field to meet requirements in general education. Specific information about academic majors or general education requirements may be obtained from advisers or from the Student Information Services Center, 306 Waterman Building. In addition, the program includes a planned sequence of professional courses, laboratory experiences, and the Personal Component (Ed. 198).

Teaching Fields

All teacher education candidates must have, prior to their student teaching, at least 30 credit hours in a teaching major and 18 hours in a teaching minor or at least 48-50 hours in a Broad Field major. The following are current approved majors, minors, and Broad Field majors (detailed outlines, developed in cooperation with the respective departments, are available at the Student Information Services Center, 306 Waterman Building).

MAJORS: Biological Science, Chemistry, Earth Science, English, French, German, History, Latin, Mathematics, Music (36 hrs.), Physical Science, Physics, Spanish, Speech & Drama.

MINORS: Biology, Chemistry, Earth Science, Economics, English, French, Geography, German, Health Education, History, Latin, Mathematics, Physical Education, Physics, Political Science, Russian, Sociology, Spanish, Speech & Drama.

BROAD FIELD MAJORS: Natural Science, Social Studies.

Students should select majors and minors which are logically related and which commonly occur as teaching combinations in secondary schools. The major-minor or Broad Field program must include credits in advanced courses.

A grade of less than C may not be applied to the minimum required credits in majors and minors or Broad Field and professional education.

EXPERIENCES IN PUBLIC SCHOOLS Students in secondary education usually have direct experiences in public schools throughout the four-year curriculum. During the sophomore year students observe and participate as teacher assistants in local junior and senior high schools. During the senior year students devote eight continuous weeks to full-time teaching in public secondary schools. In most cases students must arrange to live off campus during the student teaching assignment.

Applications for all field experiences must be made one semester in advance of assignments, and the student must assume responsibility for meeting deadlines. Information about application and assignment procedures may be obtained from the Coordinator of Professional Laboratory Experiences, 412 Waterman Building.

A typical program is as follows:

Freshman Year		1st SEMESTER	2nd SEMESTER	Sophomore Year		1st SEMESTER	2nd SEMESTER
*English (select from Eng. 1-18)		3	or 3	*English (select from Eng. 21-198)		3	or 3
Speech 11 or 31 (81 with permission)		3	or 3	Psychology 1		3	or 3
Foundations of Education (Ed. 2)		3	or 3	Participation (Ed. 15)		2	or 2
*Social Science—(for certification purposes 3 credits of U.S. History and 3 credits of Pol. Sci. 21 are recommended;)			3	Personal Component (Ed. 198)		1	& 1
One elective from the Science and Mathematics area		3	or 3	General Education electives or approved electives in major and minor or Broad Field			
One elective from the Humanities area		3	or 3			1st SEMESTER	2nd SEMESTER
Personal Component (Ed. 198)		1	& 1	Senior Year			
Physical Education		1	& 1	Personal Component (Ed. 198)		1	or 1
General Education electives or approved electives in major and minor or Broad Field				Secondary Methods & Procedures (Ed. 178)		—	3
				Special Subject Methods & Procedures (Ed. 179)		—	3
				(Ed.—Eng. 182 for English majors and Ed.—Speech 294 for Speech majors)			
				History of Educational Thought (Ed. 190)		—	3
				Student Teaching (Ed. 181)		—	8
				General Education electives or approved electives in major and minor or Broad Field			
Junior Year		1st SEMESTER	2nd SEMESTER				
Learning and Human Development (Ed. 145-146)		3	3				
Personal Component (Ed. 198)		1	& 1				
General Education electives or approved electives in major and minor or Broad Field							

* Recommended to meet specific state and national certification requirements.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education offices.

The teaching major in physical education, open to men and women, qualifies candidates to teach physical education in grades K-12. Courses will be selected within the broad areas of: General Education, General Professional Education (including a Personal Component (Ed. 198), Specific Professional Education (including a major and minor), and unstructured electives. Graduates are awarded a degree for Bachelor of Science in Education.

All physical education majors will be required to purchase a special instructor's uniform.

	1st SEMESTER	2nd SEMESTER
The Freshman Year		
Personal Component	1	1
Anatomy and Physiology	3	3
Physical Ed. Activities	2	2
Foundations of Phys. Ed.	3	3
Foundations of Education	3	3
English Elect (1-18)	3	3
English Elect (21-198)	3	3
Public Speaking	3	3
General Psych	3	3
Health Education ²	3	3
Elective	3	3
	<hr/> 17	<hr/> 17

	1st SEMESTER	2nd SEMESTER
The Junior Year		
Personal Component	1	1
Learning & Human		
Devel.	3	3
P.E. in the El. School	3	or 3
P.E. in Sec. School	3	or 3
Kinesiology	3	or 3
Physiology of Muscular		
Act.	3	or 3
Major Elective	3	or 3
Electives	8	8
	<hr/> 17	<hr/> 17

The Sophomore Year	1st SEMESTER	2nd SEMESTER
Personal Component	1	1
Am. History or Pol. Sci.		
Elect	3	3
Physical Educ. Activities	2	2
Science or Social Science elective ¹	3-4	3-4
Humanities Elect	3	or 3
C & P Athletic Injuries ²	2	or 2
Devel. of Motor Skills	2	or 2
Participation	x	or x
Electives	9	9
	<hr/> 17	<hr/> 17

	1st	2nd
The Senior Year	SEMESTER	
Personal Component	1	or 1
Phys. Ed. for the Atypical		
cal	3	or 3
Org. and Adm. of P.E. ²	3	or 3
Major elective	3	or 3
Tests & Measure. in P.E. ³	3	or 3
Hist. of Educ. Thought ³	3	or 3
Student Teaching	8	or 8
Electives	6	6
	<hr/> 17	<hr/> 17

³ Accelerated course

Physical Education majors will present a minimum of 130 approved semester hours for the degree.

Students are responsible for obtaining information regarding teacher certification and degree requirements from the appropriate College of Education offices.

Fifth-Year Certificate in Education

A special fifth-year program culminating in a certificate of advanced study is offered for students who wish to work beyond the bachelor's degree but who need or desire more flexibility than is possible in any of the standard programs for master's degrees.

The certificate program is especially designed to meet the needs of teachers who are developing new teaching fields, for advanced students who are meeting requirements for state certification, and for experienced teachers who desire flexibility in choice of courses at both graduate and undergraduate levels.

Each certificate program is individualized to fit the qualifications and the professional objectives of the candidate. Undergraduate courses may be approved for the program when such courses appropriately support the candidate's professional objectives.

The program for the *Fifth-Year Certificate* is governed by the following regulations:

- (1) Candidates must hold a bachelor's degree.
- (2) Candidates must make written application on forms obtained from the Office of the Dean of the College of Education.
- (3) Candidates are admitted to the program by action of a faculty committee.
- (4) A maximum of twelve credits may be applied to the program at the time of admission.
- (5) A maximum of nine credits may be transferred from other institutions.
- (6) Credits for the program may be earned in the regular academic year, the Summer Session, and the Evening Division.
- (7) The program for each candidate must include a minimum of thirty credits approved by a faculty adviser.
- (8) A minimum mark of C must be made in any course which is to be included in the program.
- (9) No comprehensive examination or formal thesis is required for completion of the program, but the candidate will submit a culminating paper under the direction of his faculty adviser.
- (10) The program must be completed within seven years after the time of admission.

Requests for further information about fifth-year programs should be directed to the College of Education Student Information Services Center, 306 Waterman Building.

International Education Field Study

The College of Education now offers comparative education programs in England, Japan, Africa, and Europe. The purpose of these programs is two-fold: 1) to provide an in-depth experience in the educational system of

another country; and 2) to give the students an opportunity to live in a society different from their own.

Traveling abroad has a number of advantages. First, it broadens the outlook of the person involved in the experience whether it be social, educational, or political. Second, it affords one an opportunity to observe people in their indigenous environment. Third, it allows for an exchange of ideas and philosophies. Finally, it adds a new dimension to one's life in being able to share one's thoughts and feelings with others of a different culture.

Specifically, these programs are designed primarily to offer students something more than the usual "study abroad" experience. In addition to the usual visits to places of local cultural interest, this program offers an opportunity for each student to relate his professional needs, interests, goals and aspirations to a specific educational area. Students will have the opportunity to visit many areas of cultural and personal interest but, in addition, will live with a family in the host country and work as a paraprofessional in one or more of the host nation's schools.

For further information contact Director, International Education Programs, University of Vermont, College of Education, Burlington, Vermont 05401.

V The College of Technology

The College of Technology includes the Departments of Chemistry, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Mathematics. It offers a number of specialized professional curricula in these fields, and in physics and geology, leading to the degree of Bachelor of Science in the field of specialization. Details are given in the sections immediately following. In addition to the courses listed in the several curricula, all students must fulfill the general requirements in physical education. Students whose curricula require them to take two years of mathematics are referred to the footnote under the offerings of the Department of Mathematics for information concerning the possible sequences of courses in freshman mathematics.

The Chemistry Curriculum

The Department of Chemistry offers a curriculum leading to the degree of Bachelor of Science in Chemistry. This curriculum is designed to give a sound basic training in chemistry, to prepare the student for service in some branch of the chemical profession, and to qualify him adequately for advanced study in graduate school.

A minimum of 120 approved semester hours is required for the degree in this curriculum, plus required courses in physical education. The student's program must include the following courses: Chemistry 11, 12 (or 1, 2 and 123); 131, 132, 134, 135, 141, 142, 184, 201, 202, 212, 213, at least 9 semester hours of advanced chemistry electives, which may include 197, 198; Physics 5, 6 or equivalent; Math 13, 14, 123 (or equivalent), Math 271; proficiency in German equivalent to German 11, 12. In addition the student must take sufficient courses outside the natural sciences to satisfy the distribution requirements outlined by the College of Arts and Sciences (see pp. 85).

A typical program for those wishing to obtain the B.S. degree in Chemistry is as follows:

	1st	2nd		1st	2nd
	SEMESTER			SEMESTER	
The Freshman Year			The Sophomore Year		
General Chem. 11, 12	5	5	Organic Chem. 131, 132	3	3
Electives	3	3	Organic Chem. laboratory 134, 135	2	2
Mathematics, 13, 14	4	4	Physical Chem. 142, 141	3	3
Physics 5, 6	4	4	Mathematics 123, 271	4	3
	16	16	Electives	3	3
				15	14

	1st	2nd		1st	2nd
The Junior Year	SEMESTER		The Senior Year	SEMESTER	
Adv. Inorganic Chem- istry 212, 213	3	3	Advanced Chemistry Electives ¹	3	3
Adv. Chemistry Lab- oratory 201, 202	4	4	Research 197, 198 ²	3	3
German or elective	4	4	German or elective	3	3
Electives	3	6	Electives	6	3
	14	17	Seminar 184	—	1
				15	13

Those who wish a less intensive training in chemistry may take the liberal arts curriculum with a concentration in Chemistry and receive the Bachelor of Arts degree (see p. 85).

The Engineering Curricula

The engineering curricula are designed to help students learn to approach and deal in a professional manner with problems and situations they will meet as engineers, citizens and individuals. From this basic preparation they should continue to learn from experience and to grow in stature throughout their professional life.

The Departments of Engineering offer instruction in four curricula, Civil, Electrical, Manufacturing and Management, and Mechanical Engineering, each leading to the degree of Bachelor of Science in the field of specialization. Each curriculum includes the general subjects: mathematics, chemistry, physics, graphics, elements of electrical engineering, mechanics, thermodynamics, economics and English.

The College of Technology also offers the Bachelor of Science Degree to those qualified students in the community who are unable to attend regularly scheduled courses. Consult the Evening Division Bulletin for further information.

The required courses in each curriculum are shown arranged for a four-year program. These courses may be arranged in a five-year sequence if desired. Also, the courses can be arranged to accommodate transfer from other curricula. One year of physical education is normally required of all students.

All junior engineering students visit Northeastern industrial centers during spring vacation. This plant inspection trip is required for graduation. The expense for the trip of several days is borne by the student.

Students enrolled in the civil, electrical, and mechanical engineering curricula may become affiliated with their respective national professional engineering societies, the American Society of Civil Engineers, the Institute of Electrical and Electronics Engineers, and the American Society of Mechanical Engineers, as each organization has authorized a student chapter at the University of Vermont. Engineering students demonstrating high scholarship attainment combined with exemplary character are recognized by membership in the Vermont Alpha Chapter of Tau Beta Pi, the national engineering honor society. These student organizations' meetings present opportunities for students to conduct activities similar to those of the

¹ Courses in biochemistry are acceptable as advanced chemistry electives.

² May be taken only with the permission of the department.

national societies. These include: technical papers presented by students and engineers actively engaged in their profession; attendance at conventions; and inspection trips. These provide helpful contacts with engineering practice and assist in the development of leadership qualities essential to success in the engineering profession.

The curricula in civil, electrical and mechanical engineering are accredited by the Engineers' Council for Professional Development.

HUMANISTIC-SOCIAL STUDIES FOR ENGINEERING STUDENTS The objective of the program in humanities and social studies is to broaden the engineering student's understanding of man and the relationships in human society. Each student should plan, in consultation with his adviser, an integrated sequence of courses to meet this objective.

A minimum of twenty-four credit hours is required in humanistic-social studies. To meet this requirement each student must satisfy the following distribution:

Required of all students	Minimum credit hours
1. English Electives (must be taken the Freshman year) ¹	6
2. Courses from at least two areas listed below	12
3. Courses from one additional area listed below	6
Minimum total	<hr/> 24

Elective Areas

Geography	Intermediate Classical Languages
History	Intermediate Romance Languages
Philosophy	Intermediate German
Religion	Intermediate Russian
Political Science	Literature courses
Psychology	Art (history courses only) ^{1, 2}
Sociology	Music (history and Survey courses only) ²
World Problems	Economics (history and theory courses only)
	Speech (history and literature courses only) ³

Civil Engineering

The curriculum in Civil Engineering, leading to the degree of Bachelor of Science in Civil Engineering, offers instruction in community planning, construction engineering, environmental engineering, hydraulics and hydrology, materials, soil mechanics, structural engineering, and transportation engineering, as well as in the engineering sciences, mathematical sciences, natural sciences, humanities, and the human and social sciences. Every candidate for this degree must earn a minimum of 120 semester hours of credit plus the required courses in physical education.

Each student, with the approval of his advisor, must present a program of courses and study that satisfies the distribution requirements in the Group I, Group II, Group III and the Intern/Extern categories that follow:

A. Group I. A student must elect twelve courses from this group, by

1. Requirement does not apply to the Mathematics Department.
2. E. E. Department permits unlimited choice.
3. E. E. Department permits unlimited choice except for speech pathology courses.

choosing at least three courses from each of three of the designated areas. The three remaining courses may be taken from any area or areas in this group.

Group I Areas

- | | |
|---|--|
| 1. Business Administration | 4. Social Sciences—Anthropology, |
| 2. Education. | Economics, Geography, History, |
| 3. Humanities—Languages, Liter-
ature Fine Arts, and Philosophy. | Political Science, Psychology,
and Sociology. |

B. Group II. A student must elect twelve courses from this group, by choosing at least three courses from each of three of the designated areas. The three remaining courses may be taken from any area or areas in this group.

Group II Areas

- | | |
|---------------------------|----------------------------------|
| 1. Engineering Sciences. | 3. Natural Sciences—Earth, Life, |
| 2. Mathematical Sciences. | Physical. |

C. Group III. A student must elect twelve courses from this group, by choosing at least three courses from each of three of the designated areas in Civil Engineering. The three remaining courses may be from any area or areas in this group, but they must contribute to his program objectives. At least nine of these courses must be in Civil Engineering.

Group III Areas

- | | |
|----------------------------|------------------------------|
| 1. Civil Engineering. | Structural Engineering. |
| Community Planning. | Transportation. |
| Construction. | 2. Other Engineering. |
| Environmental Engineering. | 3. Agriculture. |
| Hydraulics—Hydrology. | 4. Medicine. |
| Materials. | 5. Other Professions. |
| Soil Mechanics. | 6. Special Areas of Support. |

D. Intern/Extern. A student must satisfactorily complete three intern and one extern assignments. Intern assignments are individual or group investigations that are under the guidance of one or more faculty members. Extern assignments consist of practical engineering experiences in selected public and private organizations. Each student will work under the guidance of an experienced engineer or other professional person.

The Freshman Year for all Curricula

(Except Civil Engineering)

	1st	2nd
SEMESTER		
Mathematics, 13 ¹ , 14	4	4
Chemistry, 1-2 ²	4	4
Engineering Graphics, M.E. 1, 2 ³	2	2
English Electives	3	3
General Physics, 17, 18	3	3
	16	16

1. See footnote under course offerings of the Department of Mathematics.
2. Pre-medical option students must take Chem. 1, 2. Computer option students take Math 115, 116 in place of Chem. 1, 2. General option students may substitute Life Science courses with departmental approval.
3. E.E.'s take Engineering Analysis I, E.E. 2, instead of M.E. 2.

Electrical Engineering

			1st 2nd SEMESTER	
The Sophomore Year				
Humanistic-Social Studies			3	3
Mathematics, 123			4	—
Elem. Probability, Math. 203			—	3
Physics, 27, 128			4	4
Laboratory, E.E. 81, 82			1	2
Engineering Analysis II, E.E. 3			3	—
Engineering Analysis III, E.E. 4			—	3
Engineering Computation I, E.E. 31			2	—
Engineering Computation II, E.E. 32			—	2
			17	17
			1st 2nd SEMESTER	
The Junior Year				
Humanistic-Social Studies			3	3
Electromagnetic Field Theory, E.E. 143, 144			3	3
Thermodynamics, M.E. 115			3	—
Electronics I, E.E. 121			3	—
Laboratory, 183, 184			2	2
Signals and Systems, E.E. 171			3	—
Electromagnetic Properties of Materials, E.E. 162			—	3
Control Systems, E.E. 111			—	3
Electronics II, E.E. 122			—	3
			17	17
The Senior Year				
Humanistic-Social Studies			3	3
Approved Mathematics Elective			3	—
Solid State Physical Electronics, E.E. 163			3	—
Laboratory, 185			2	—
Energy Conversion I, E.E. 113			3	—
Electronics III, E.E. 123			3	—
Information Transmission Systems, E.E. 174			—	3
Laboratory, E.E. 186			—	1
Laboratory, E.E. 188			—	1
Energy Conversion II, E.E. 114			—	3
Wave and Diffusion Analogies, E.E. 146			—	3
Elective			—	3
			17	17

The above comprises what is termed the general option curriculum, for which a minimum of 134 approved semester hours is required, plus required courses in physical education. Two other options are offered, with changes from the general option curriculum as follows:

(A) A pre-medical option curriculum with a minimum of 138 approved semester hours in which the free and Math. electives in the senior year and two courses selected with departmental approval among E.E. 174, 162, 163, 113, 114 and M.E. 115 are replaced by Chemistry 131, 132 and Biology 1, 2.

(B) A computer engineering option curriculum with a minimum of 134 approved semester hours in which

1. Freshman year: Chem. 1, 2 replaced by Math. 115, 116.
2. Sophomore year, 2nd semester: E.E. 32 replaced by Math. 124.
3. Junior year, 1st semester: M.E. 115 replaced by E.E. 236.
4. Junior year, 2nd semester: Humanistic-Social course replaced by E.E. 237.

5. Senior year, 1st semester: Math. elective replaced by Math. 237 and E.E. 113 replaced by Math. 218 or equivalent. E.E. 187 is an additional required course.
6. Senior year, 2nd semester: E.E. 114 replaced by a Humanistic-Social elective and E.E. 146 replaced by Math. 238.

Mechanical Engineering

	1st	2nd
SEMESTER		
The Sophomore Year ¹		
Engineering Math. III, Math. 123	4	—
General Physics, 27	4	—
Manufacturing Processes, M.E. 53	3	or 3
English Elective	3	or 3
Statics, C.E. 01	3	—
Creative Design, M.E. 73	3	—
Introduction to Modern Physics, Physics 128	—	4
Dynamics I, M.E. 133	—	3
Thermodynamics I, M.E. 92	—	3
Engineering Experimentation, M.E. 119	—	2
	<hr/> 17	<hr/> 15

¹ "Elementary proficiency in use of digital computers" required in Sophomore year.

	1st	2nd		1st	2nd
SEMESTER			SEMESTER		
The Junior Year			The Senior Year		
Mech. of Materials, I, C.E. 100	3	—	Industrial Materials I, M.E. 171	3	—
Thermodynamics II, M.E. 111	3	—	Systems Control, M.E. 137	2	—
Applied Math. for Engrs. and Scientists, Math. 271	3	—	M.E. Elective ²	3	4
Electrical Engineering Principles, E.E. 101, 102	4	4	Tech. Elective ³	3	—
Heat Transfer, M.E. 266	—	3	Thesis, M.E. 192, or M.E. Elective ²	—	3
Fluid Mechanics, M.E. 142	—	3	Engineering Design Analysis and Synthesis, M.E. 294	—	4
Engineering Design I, M.E. 135	—	4	Humanistic-Social Studies ¹	3	6
Humanistic-Social Studies ¹	3	3		<hr/> 14	<hr/> 17
	<hr/> 16	<hr/> 17			

A minimum of 128 approved semester hours is required for the degree in this curriculum, plus required courses in physical education.

A student who, at the end of his junior year, has a cumulative average of 3.0 or above may become an applicant for the honors program in a special area of study. If accepted the student will determine his own program under the guidance of his adviser.

1. See distribution of Humanistic-Social Studies on page 110. Econ. 11, 12 is required.
2. Any 200 level course with approval of the Mechanical Engineering Department.
3. Technical electives from departments of engineering, mathematics or physical sciences.

Manufacturing and Management Engineering

	1st	2nd
SEMESTER		
The Sophomore Year		
General Physics, Physics 27	4	—
Engrg. Math. III, Math. 123	4	—
Creative Design, M.E. 73	3	—
Statics, C.E. 01	3	—
Intro. to Modern Physics, Physics 128	—	4
Applied Math. for Engrs. and Sc., Math. 271	—	3
Dynamics I, M.E. 133	—	3
Thermo. & Heat Transfer, M.E. 113	—	3
Princ. of Econ., Econ. 11, 12	3	3
	17	16
	1st	2nd
SEMESTER		
The Junior Year		
Electr. Engrg. Princ., E.E. 101, 102	4	4
Mech. of Mat'ls I, C.E. 100	3	—
Industrial Materials I, M.E. 171	3	—
Materials Processing I, M.E. 131	—	3
Fluid Mechanics, M.E. 142	—	3
Technical elective ⁴	3	3
Humanistic-social elective	3	3
	16	16
	1st	2nd
SEMESTER		
The Senior Year		
Statistical Methodology I, Math. 200	3	—
Methods Engineering, M.E. 175	3	—
Materials Processing, II, M.E. 231	3	—
Engrg. Economy, C.E. 225	3	—
Statistical Techniques in Mfg., M.E. 233	—	3
Plant Organization, M.E. 176	—	4
Engineering Design I, M.E. 135	—	4
Technical elective ⁵	—	3
Humanistic-social elective	3	3
	15	17

A minimum of 129 approved semester hours is required for the degree in this curriculum, plus required courses in physical education.

A student who, at the end of his Junior year, has a cumulative average of 3.0 or above may become an applicant for the honors program in a special area of study. If accepted the student will determine his own program under the guidance of his adviser.

The Geology Curriculum

The curriculum is designed to prepare students for graduate study in geology and occupational activity at a professional level. Students are encouraged to combine geology with one or more related disciplines to develop a strong background for pre-professional training. Examples of such interdisciplinary fields

4. To be selected from the following: Econ. 9, 10, 121, 141, 207, 251.

5. To be selected from departments of engineering, mathematics or physical sciences.

include geochemistry, oceanography, geological engineering, geomathematics, environmental studies and geobiology. An advisor from the department will assist students in developing a curriculum tailored to individual needs. Students in the College of Arts and Sciences may also concentrate in geology and receive a Bachelor of Arts degree.

	1st		2nd
The Freshman Year	SEMESTER		SEMESTER
Mathematics 13	4	Mathematics 14	4
Chemistry 11	5	Chemistry 12	5
Geology 1	4	Liberal Arts Elective	3
English Elective	3	English Elective	3
		Physical Education	1
	<hr/> 16		<hr/> 16
The Sophomore Year		Physics 6	
Mineralogy 11	4	Biology 2	4
Mineralogy 145	3	Geology Elective	3
¹ Physics 5		Liberal Arts Elective	3
Biology 1	4	Chemistry Elective	3
Liberal Arts Elective	3	Geology 156	4
Physical Education	1		
	<hr/> 15		<hr/> 17
	1st		2nd
The Junior Year	SEMESTER		SEMESTER
Geologic History of Life		Structure 166	3
121	3	Liberal Arts Elective	3
Sedimentary Petrology 155	3	Ancillary Elective	3
² Ancillary Elective	3	Geology Elective	3
Ancillary Elective	3	Engineering Elective	3
Computer Science or			
Statistics	3		
	<hr/> 15		<hr/> 15
The Senior Year		Research 198	4
Field Geology 238	3	Geology Elective 200	3
Research 197	4	Ancillary Elective	3
Geology Elective 200	3	Two Liberal Arts Electives	6
Engineering Elective	3		
Ancillary Elective	3		
	<hr/> 16		<hr/> 16
Synopsis			
Geology courses			
Specific courses	35		
Electives	12	47	
Ancillary			
Specific courses	26		
Electives	21	47	
Engineering Electives	6	6	
Liberal Arts	18	18	
English Electives	6	6	124 hours

1. Students concentrating in geophysics must take Physics, 17, 18, 27.
2. Courses in science, mathematics, or engineering selected so as to develop a minor area of concentration.

The Mathematics Curriculum

This curriculum is designed to provide sound basic training in mathematics, to prepare the student for a position in an area in which mathematicians are sought, and to qualify him for advanced study in graduate school. Students in the College of Arts and Sciences may also concentrate in mathematics and will receive the Bachelor of Arts degree. An adviser from the department will assist students in the determination of a program best suited to their individual needs and plans.

	1st	2nd
The Freshman Year	SEMESTER	
Mathematics, 11, 12	5	5
Science ²	3-4	3-4
Humanistic-Social Studies	3	3
Electives	4-3	4-3
	15	15

	1st	2nd
The Sophomore Year	SEMESTER	
Mathematics, 121, 124	3	3
Mathematics, 102	—	3
General Physics, 17, 18	3	3
Humanistic-Social Studies	3	3
Electives	6	3
	15	15

	1st	2nd
The Junior Year	SEMESTER	
Mathematics Electives ³	6	6
Physics 27	4	—
Humanistic-Social Studies	3	3
Electives	2	6
	15	15

	1st	2nd
The Senior Year	SEMESTER	
Mathematics Electives ³	9	9
Science ⁴	3	3
Humanistic-Social Studies	3	3
	15	15

HUMANISTIC-SOCIAL STUDIES FOR MATHEMATICS MAJORS

A minimum of twenty-four hours is required in humanistic-social studies. To meet this requirement each student must satisfy the following distribution:

1. Six semester hours in courses from one area listed below.
2. Eighteen semester hours in courses from at least two other areas listed below.

Advanced Literature Courses
 Anthropology
 Art
 Economics
 English
 Geography
 History
 Intermediate Classical Languages
 Intermediate German

Intermediate Romance Languages
 Intermediate Russian
 Music
 Philosophy
 Political Science
 Psychology
 Religion
 Sociology
 Speech
 World Problems

A minimum of 120 approved semester hours is required for the degree in this curriculum, plus required courses in physical education.

1. See distribution of Humanistic-Social Studies on page 116.
2. Physical science, biological science, agricultural science, medical science or engineering courses.
3. Courses numbered 200 or above.
4. Physical science, biological science (including experimental psychology), agricultural science, medical science or engineering courses beyond the sophomore level, to constitute a minor specialization.

The Physics Curriculum

The Department of Physics offers a pre-professional curriculum leading to the degree of Bachelor of Science in Physics. This program is designed to give a strong background for future professional education in industry or graduate school. Students in the College of Arts and Sciences may also concentrate in physics and receive a Bachelor of Arts degree.

	1st	2nd
The Freshman Year	SEMESTER	
English Electives	3	3
Mathematics ^{1,3} 11, 12 or 13, 14	4-5	4-5
Chemistry ^{2,3} 11-12	5	5
Physics 17, 18	3	3
	15	15
	or 16	or 16

	1st	2nd
The Sophomore Year	SEMESTER	
Liberal Arts Elective	3	3
Mathematics 121, 124 or 123, 124	3-4	3
Physics 27, 128	4	4
Elective	3-4	3-4
Elective	3-4	3-4
	16	16
	to 19	to 18

	1st	2nd
The Junior Year	SEMESTER	
Physics 213, 214	3	3
Physics 211, 216	3	3
Physics 101, 102 ⁵	3	3
Mathematics Elective ⁴	3	3
Elective	3	3
	15	15

	1st	2nd
The Senior Year	SEMESTER	
Physics 271, 272	3	3
Physics 203, 204 ⁵	3	3
Physics 265	3	—
Scientific Elective	—	3-4
Elective	3	3
Elective	3-4	3-4
	15	15
	or 16	to 17

A minimum of 120 semester hours is required for the degree in this curriculum, plus required courses in physical education.

The Technical Information Center

Through the Technical Information Center, the College of Technology offers a technical information service to answer questions from Vermont industry, business, government agencies and private citizens. The Center has constantly expanded its range of sources for technical assistance, particularly in the area of industrial and municipal pollution control, since the service began in 1968.

1. See footnote under course offerings of Department of Mathematics.
2. Chemistry 1-2 is acceptable for a student of limited background.
3. A student electing both mathematics 13, 14 and chemistry 1-2 would only be carrying 14 credits during each semester of the freshman year. Such a student might well consider an elective course in either or both semesters.
4. "The undergraduate major is required to take at least two advanced courses in mathematics beyond the sophomore year. In addition he or she is required to become competent in computer programming."
5. With departmental permission, a student may replace one or more of the Junior-Senior laboratory courses with equivalent laboratory experience in Physics 197, 198, in industrial employment, or in suitable course offerings of other departments. Any difference in academic credits may be included among electives.

The Center also provides a continuing education service to the New England construction industry and supporting professions. The service, funded by the W. K. Kellogg Foundation, is coordinated on a regional level by the New England Center for Continuing Education. Short courses, seminars and conferences to meet the expressed needs of contracting, architectural and consulting firms and construction-related organizations and agencies in the six New England states are provided.

For further information, contact the Technical Information Center, Votey Building: (telephone 656-2140).

V The Division of Health Sciences

The Division of Health Sciences, authorized by the Board of Trustees, became effective July 1, 1968, bringing together several related programs in this important field. It includes the College of Medicine, the School of Allied Health Sciences, and the School of Nursing.

The Division reserves the right to require the withdrawal of any student from any curricula whose health, academic record or performance and behavior in the professional careers is judged unsatisfactory.

The School of Allied Health Sciences

The Program in Dental Hygiene

A School of Dental Hygiene was established in the fall of 1949 on authorization and a grant of money by the State Legislature, and became a Department in the School of Allied Health Sciences in 1968. Its purpose is to meet the increasing need for dental health services.

The Department of Dental Hygiene offers a two-year curriculum leading to an Associate in Health Science degree and a Certificate in Dental Hygiene. A program offering a Bachelor of Science is being studied.

The program is accredited by the Council on Dental Education of the American Dental Association. Graduates are eligible to write the National Board Examination in Dental Hygiene and meet requirements for licensure determined by individual states.

The duties of a graduate dental hygienist are educational and preventive in nature and may be carried out in private dental practice, public institutions, hospitals and industrial clinics, and public health programs. Dental hygienists practice under the supervision of a dentist. The primary concentration of her skills is in oral health education, oral prophylaxis and inspection. However, she is qualified to perform procedures for the prevention of dental caries, expose and process dental radiographs, and assist in other phases of dental practice. The dental hygienist is a vital member of the health science professions, and her opportunities are practically unlimited.

Requirements for admission to study in the Dental Hygiene Program are identical with general University requirements, with the additional requirement that applicants write the Dental Hygiene Aptitude Test. Information and application forms for this test are available from the American Dental Hygienists' Associa-

tion, 304 East 45th Street, New York, N.Y. 10017. Applicants are also required to have a personal interview, preferably after their application is completed.

As this program of study is scientifically oriented, high school courses in algebra, chemistry, biology and physics are important prerequisites. Personal attributes essential to success in this program include good health, emotional stability, task orientation, high moral standards and an ability to relate well with society.

The courses of study are designed to give the student a well rounded foundation in basic sciences, specific knowledge in dental sciences and an understanding of the humanities. Clinical experience is obtained in the department's dental hygiene clinic where patients of all ages and with varieties of problems receive service, and in community oral health care situations. Dental hygiene students also have an opportunity to increase their communication skills through oral health education presentations in schools in the area.

Students applying for this program should be interested in and have aptitude for scientific studies.

	1st	2nd		1st	2nd
The Freshman Year	SEMESTER		The Sophomore Year	SEMESTER	
English	3	—	Cultures of Man, Soc.	—	3
Oral Tissues 11-12	3	2	and Anthropol, 21	—	3
Dental Hygiene 1-2	2	3	Oral Pathology 53-54	2	2
General Psychology 1	—	3	Pharmacology and Anes-		
Physical Education	1	1	thesiology, 51-52	1	1
Dynamics of Health Care	2	—	Dental Health Education		
Integrated Basic Science	—	6	and Public Health,		
Chemistry 3-4	4	4	72-74	2	2
Microbiology 55	4	—	Dental Materials,		
	19	19	91-92	1	1
			Public Speaking, Speech II	3	—
			Periodontics, 55	1	—
			Dental Practice, 62	—	1
			Radiology, 61	1	—
			Home Economics, H141	3	—
			Clinical Dental Hygiene,		
			81-82	5	5
			Elective	—	3
				19	18

The Program in Medical Technology

Students admitted to the Medical Technology Program in the Fall of 1972 will enroll in an integrated Associate Degree medical laboratory technician and a Baccalaureate Degree medical technology program.

This new curriculum has several advantages; after completion of the Associate Degree program the graduate may be eligible for MLT certification by the Board of Registry of the American Society of Clinical Pathologists and shall have obtained an employable skill. Another major advantage is the opportunity to offer a more challenging program to the student continuing to the Baccalaureate Degree. They will be provided the option of greater education and experience in depth and breadth in the entire field of medical technology, or to permit earlier specialization in one of the disciplines within medical tech-

nology. This new program will also offer the opportunity for the inclusion of essential administrative, personnel and management courses for the Baccalaureate graduate.

The minimum requirements planned for the first two years of this new program are as follows:

	Credit Hours	
	1st	2nd
Dynamics of Health Care 1	2	—
English	3	—
Mathematics*	3-5	—
Chemistry 3, 16	4	4
Physiology 9	—	6
Laboratory Science 11	—	3
Physical Education	1	1
Medical Technology 3	—	1
Elective	3	3

* Achievement Tests are required for all students planning course work at the collegiate level. The purpose of requiring these achievement tests is for placement only.

The second year is designed as follows:

	1st	2nd
	SEMESTER	
Medical Technology 20, 21	6	4
Medical Technology 40, 41	2	6
Microbiology 55	4	—
Biochemistry 102	—	4
Electives	3	—

A minimum of 60 approved semester hours is required for the Associate Degree in this curriculum, plus 1 year of required course in physical education.

Proposed Third and Fourth Year Leading to Baccalaureate Degree

The Junior Year	1st	2nd
	SEMESTER	
Biochemistry 111-112	4	4
Physics 5-6 (or 11-12)	4	4
Advanced Specialty Core	—	6
Electives	9	3
	17	17

The Senior Year	1st	2nd
	SEMESTER	
Medical Technology 197	4	—
Medical Technology 198	—	3
Medical Technology 140, 141	4	4
Pathology 101	3	—
Elective	6	9
Medical Technology 199	—	1
	17	17

Students currently enrolled in the MLT-MT curricula will continue their programs as described in the 1971-72 Bulletin—i.e.

Medical Laboratory Technicians

	1st SEMESTER	2nd SEMESTER
The Second Year		
Medical Technology 20-21	6	4
Medical Technology 40-41	2	9
Introductory Microbiology 55	4	—
Medical Orientation 3	—	1
Electives	6	—
	<hr/> 18	<hr/> 14

Medical Technology

	1st SEMESTER	2nd SEMESTER
The Sophomore Year		
Zoology 103	4	—
Chemistry 131	4	—
Physics 5-6	4	4
Approved electives	4	8
Biochemistry 102	—	4
	<hr/> 16	<hr/> 16

	1st SEMESTER	2nd SEMESTER
The Junior Year		
Introductory Microbiology 55	4	—
Biochemistry 111-112	4	4
Approved Electives	8	8
Medical Technology 101	—	4
	<hr/> 16	<hr/> 16

	1st SEMESTER	2nd SEMESTER
The Senior Year		
Medical Technology 102	4	—
Medical Technology 103	—	1
Medical Technology 120	6	—
Medical Technology 110	—	2
Practicum 140, 141	5	9
Medical Technology 197-198	1	2
	<hr/> 16	<hr/> 14

Notes: Total credit hours required for graduation: 126 (excluding Physical Education).

*Course dependent upon Freshman placement. (One semester of Calculus may suffice.) Medical Technology 201 recommended for students anticipating Graduate School. Chemistry 16 may be substituted for Chemistry 131.

The Program in Physical Therapy

The program in Physical Therapy is a four-year curriculum leading to a Bachelor of Science degree. In the freshman and sophomore years, students will concentrate on the necessary prerequisite courses. These prerequisites are in the humanities, sciences, and social sciences. In the upper-sophomore year, the student will begin the basic sciences of anatomy and physiology and an introductory course in Physical Therapy. The junior and senior years are devoted to the professional program with time to further explore the humanities and social sciences required for a liberal education. During the professional program, the clinical education experiences will provide the student with concur-

rent opportunities to apply the acquired knowledge and skills. The program of study is:

	1st	2nd		1st	2nd
The Freshman Year	SEMESTER		The Sophomore Year	SEMESTER	
*English	3	—	Physics 5, 6	4	4
C & T I	—	3	*Psychology	3	—
Chemistry 3, 16	4	4	Electives	9	—
Biology 1, 2	4	4	Anatomy 102	—	6
Dynamics of Health Care	2	—	Physiology 100	—	6
*Mathematics	3	—	Physical Therapy 22	—	2
Psychology 1	—	3		16	18
Elective	—	3			
Physical Education 1, 2	1	1			
	17	18			

* As advised

* Courses dependent on Freshman Placement

	1st	2nd		1st	2nd
The Junior Year	SEMESTER		The Senior Year	SEMESTER	
Physical Therapy 109	2	—	Physical Therapy 151-152	5	3
Physical Therapy 111	3	—	Psychology (PT-161)	3	—
Pathology 101	3	—	C & T 284	3	—
Physical Therapy 121-122	4	5	Community Health Service		
Physical Therapy 132	—	4	(PT-171)	3	—
Physical Therapy 142	—	2	Elective	3	—
Education 145, 146	3	3	Physical Therapy 158		
Elective	3	3	Clinical Education II	—	5
	18	17	Physical Therapy 172	—	2
			Physical Therapy 174	—	2
			Physical Therapy 176	—	2
				17	14

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The Program in Radiologic Technology

This associate degree program is designed to provide didactic and clinical instruction in diagnostic radiography, nuclear medicine, or radiation therapy technology within a two year (24 month) program in affiliation with the Medical Center Hospital of Vermont. Graduates should be eligible for examination by the American Registry of Radiologic Technology. A tentative program follows.

	1st	2nd
First Year	SEMESTER	
Mathematics	3 ¹	—
Physics 3	4	—
Clinical Orientation (RT 1, 2)	3	3
Intro Rad Science (RT 11, 12)	3	3
English	3	3 ²
Physiology 10	—	6
Physical Education	—	1
	16	16

¹ by placement

² or History, Philosophy, Religion

	1st	2nd
Second Year	SEMESTER	
Diagnostic:		
Dynamics of Health Care (Nursing 1)	2	—
Physical Education	1	—
Radiographic Science (RT 31)	3	—
Radiographic Techniques (RT 33, 34)	3	4
Clinical Practicum (RT 71, 72)	3	3
Electives ³	3	6
Rad Path & Clin Onc. (RT 13)	—	3
	15	16
Nuclear Medicine:		
Dynamics of Health Care (Nursing 1)	2	—
Physical Education	1	—
Chemistry 3	4	—
Nuclear Med Technology (RT 41, 42, 44)	3	6
Clinical Practicum (RT 71, 72)	3	3
Electives ³	3	3
Rad Path & Clin Onc (RT 13)	—	3
	16	15
Radiation Therapy:		
Dynamics of Health Care (Nursing 1)	2	—
Physical Education	1	—
Rad Ther Tech (RT 51, 52, 54)	3	6
Clinical Practicum (RT 71, 72)	3	3
Electives ³	6	3
Rad Path & Clin Onc (RT 13)	—	3
	15	15

3. Anthropology, Psychology, Speech, Sociology

The School of Nursing

The School of Nursing offers two distinct educational programs to prepare qualified individuals for the practice of nursing. The Professional Nursing program is four years in length and leads to the Bachelor of Science in Nursing. The Technical Nursing program is two years in length and leads to the Associate in Health Sciences degree. Direct transfers from one program to the other are not possible. Both programs are approved by the Vermont State Board of Nursing and accredited by the National League for Nursing, Inc.

Professional Nursing Program

The Department of Professional Nursing offers a curriculum leading to the Bachelor of Science in Nursing. This curriculum is designed to provide the opportunity for qualified individuals to prepare for professional practice in beginning positions in various settings, to acquire a foundation for continued formal study in nursing, and to enhance growth toward maturity as individuals, professional persons, and citizens. The graduates of this program are eligible for licensure as registered nurses, and may advance without further formal education to positions which require beginning administrative skills.

The curriculum, conducted in four academic years, provides an approximate balance in general and professional education. Courses in the sciences—biological, physical and social—serve as a foundation for the professional nursing courses which begin in the second year with concentration in the third and fourth years.

A minimum of 123 approved semester hours is required for the Bachelor of Science degree plus required courses in physical education.

A typical program of studies follows:

	1st	2nd		1st	2nd
The Freshman Year	SEMESTER		The Sophomore Year	SEMESTER	
English	3	3	Introductory Microbiology, MCBI 55	4	—
Mammalian Anatomy and Physiology, Zool. 5-6	3	3	Nutrition & Health, H. Ec. 141	3	—
Outline of Chemistry, Chem. 3-4	4	4	General Psychology, Psych. 1, or Principles of Sociology, Soc. 22	—	3
Public Speaking, C. & T. 11	3	—	Nursing 21-22	6	6
Principles of Sociology, Soc. 22, or General Psychology, Psy. 1	—	3	Electives	3	6
Elective	3	3			
	1st	2nd		1st	2nd
The Junior Year ¹	SEMESTER		The Senior Year ¹	SEMESTER	
Nursing, 121, 122	9	9	Nursing 156	6	—
Child Development			Nursing 176	6	—
Home Ec. 63	3	—	Nursing 164	—	6
Electives	3	6	Nursing 186	—	3
			Electives	3	6

In addition to the general education courses found in the curriculum outlined above, specific courses in general education are required and additional courses are elected in accordance with individual need and interest and in consultation with the faculty adviser. These are:

Philosophy	3	History, Political Science,	
Fine Arts	3	Economics or Geography	6
Psychology or Sociology	3	English, Foreign Language	
Physical Education	2	or Speech	3
		Electives	15

Students are encouraged to pursue the study of a foreign language if able to enter the intermediate level of instruction. Students desiring to learn a new foreign language may need to plan on summer sessions.

Students admitted in the fall of 1971 and thereafter will follow a revised curriculum. The general education courses will be similar to the present but distributed differently. Clinical nursing courses will be scheduled in the junior and senior years.

Technical Nursing Program

The Department of Technical Nursing offers a curricular leading to the Associate in Health Sciences Degree. The curriculum is designed to prepare quali-

1. The semesters may be reversed dependent on the student's program.

fied individuals to give direct nursing care to patients of all age groups and to promote development of the individual as a responsible member of society. The graduates of this program are eligible for licensure as registered nurses and are prepared for nursing practice in hospitals, clinics, nursing homes and other health agencies.

The curriculum is two academic years and one four-week summer session in length. General education courses account for approximately one-half of the total required credits and nursing courses for the remaining one-half. Nursing courses are taught concurrently with general education courses throughout the two years and include classroom instruction and guided clinical experiences in selected agencies.

The program of studies follows:

	1st	2nd		1st	2nd
The Freshman Year	SEMESTER		The Sophomore Year	SEMESTER	
English Elective	3	—	Nursing Care of		
Clinical Nutrition,			Children & Adults,		
H. Ec. 41	3	—	Nurs. 27-28	9	10
Dynamics of Health Care	2	—	Nursing Trends,		
Integrated Basic Science,			Nurs. 30	—	2
PSL 10	—	6	Group Discussion,		
General Psychology,			C. & T. 14	3	—
Psy 1	3	—	Electives	3	3
Principles of Sociology,					
Soc. 22	—	3			
Fundamentals of Nurs-					
ing, Nurs. 11-12	4	4			
Approved Elective*	—	3			
Physical Education	1	1			
*English					
Philosophy			Summer Session—4 weeks		
Religion			Fundamentals of Nursing,		
History			Nurs. 14	4	—

A minimum of 65 approved semester hours, plus credits in required physical education courses, is required for the degree.

Admission of Registered Nurses

The School of Nursing will consider for admission to the baccalaureate program qualified registered nurses. Admission to the program is essentially the same as for other applicants to the University. In accord with University policy, the registered nurse student may apply for credit by examination in general education and selected nursing courses.

Registered nurses planning to seek admission are urged to write to the School of Nursing for more detailed information and to arrange for a personal interview prior to applying for admission or taking courses for college credit at this or other institutions.

General Information

Applicants must satisfy the general admission requirements for the University. High School courses in biology, chemistry, and physics are highly recommended.

Grades in nursing courses are based on achievement in theory and in laboratory practice, both of which must be satisfactory to receive a passing grade. The School of Nursing reserves the right to require the withdrawal from nursing of any student whose health, academic record, or performance and behavior in nursing is judged unsatisfactory.

All students in the School of Nursing are responsible for transportation to and from the agencies which are used for clinical experiences. These include the Medical Center Hospital of Vermont; the Burlington Visiting Nurses' Association, Inc.; the Vermont State Hospital, Waterbury; Green Mountain Nursing Home and other selected agencies.

Financial aid is available in the form of scholarships, loans, prizes and employment (see page 58). Of special interest to students in nursing is the Nursing Student Loan Program. Anyone interested should make application for financial aid by February 1.

In addition to funds handled through the University, students in the baccalaureate program may apply for appointments in the Army Student Nurse Program or the Navy Nurse Corps Candidate Program at the beginning of their junior year. The appointments carry generous financial allowances. A student who participates twelve months or less serves on active duty in the respective service for twenty-four months. If two years of financial support have been received, thirty-six months of service are required.

Continuing Education

Continuing education is arranged to meet the demands of both employed and unemployed professional nurses. Special classes, seminars, institutes, and workshops are scheduled throughout the year, on the campus and in accessible communities of the state. These activities are designed to aid the nurse to keep abreast of new knowledge and to develop greater skill in nursing care. For more information, contact Continuing Education, School of Nursing, 538 Waterman, University of Vermont, Burlington, Vermont 05401.

PROFESSIONAL PERSONNEL IN COOPERATING AGENCIES

Robert B. Aiken, M.D., Commissioner of Health, Vermont State Department of Health

Mrs. Edith Bauer, M.S., R.N., Community Coordinator, Burlington Visiting Nurse Association, and Lecturer

Mrs. Elizabeth Davis, B.S., R.N., Executive Director, Burlington Visiting Nurse Association, and Adjunct Assistant Professor

Mrs. Norma Desautels, R.N., Assistant Director of Nursing, Green Mountain Nursing Home

Mrs. Tobah Gladstone, M.S., R.N., Psychiatric Nurse, Medical Center Hospital of Vermont, and Adjunct Instructor

Mrs. Vera Hanks, R.N., Chief, Patient Care Services, Vermont State Hospital
Kathryn Lambert, M.S., R.N., Acting Director of Nursing, Medical Center Hospital of Vermont, and Adjunct Assistant Professor

Mrs. Lois Sabin, B.S., R.N., Director for Educational Programs, Vermont State Hospital, and Adjunct Instructor

Mary E. Thompson, M.A., R.N., Lecturer

The College of Medicine

Requirements for Admission

Applicants to The University of Vermont College of Medicine are expected to complete the required courses of study by July 1 preceding the September admission date—in a college or university accredited by the National Committee of Regional Accrediting Agencies of the United States.

Required are one year each of the following college level courses:

- Biology
- Physics (including laboratory)
- General or inorganic chemistry
- Organic chemistry

In addition, because a physician requires a broad and balanced cultural background as well as a technical education, the College recommends as appropriate to an adequate premedical program:

English—at least one and preferably two years of composition and/or literature.

Mathematics—dependent upon secondary school preparation but should include at least an introduction to calculus.

Behavioral Sciences—one or two years in the areas of psychology, sociology or anthropology.

The Humanities—at least two years of course work in history, philosophy, religion or the arts.

The College of Medicine encourages its prospective students to concentrate while in college in a field of knowledge of their choice, whether in the sciences or humanities, and to pursue these interests in depth.

Eligibility of an applicant for admission is determined by the Admissions Committee of the College of Medicine on the basis of the following:

The scholastic record of the applicant in his premedical work.

Aptitude and motivation for the study and practice of medicine as determined by information from the applicant's undergraduate faculty and by personal interview with the Admissions Committee.

The applicant's scores on the Medical College Admission Test. Applicants are urged to take the Test in May preceding application.

The Committee strives to select as students those applicants who will benefit most from the College's specific educational program. Within the selection process, the needs of society are considered in addition to those of the individual applicant.

Preference for admission is according to the following priorities:

Qualified residents of Vermont.

Qualified residents of other New England States having contractual arrangements with the College of Medicine through the New England Board of Higher Education. Contracts are presently in effect with the States of Maine, Massachusetts and Rhode Island.

Qualified residents of other areas. The number of places for residents of other areas is limited and competition for these places is especially keen.

Sons and daughters of alumni of the College of Medicine are given special consideration within the framework of the above policy.

The final closure date for receiving applications is November 1 preceding the September admission.

An application fee of \$15.00 (not refundable) is payable on request of the Office of Admissions.

THE CURRICULUM

The curriculum consists of three parts: the basic science core, the clinical core, and the major program.

Basic Science Core

The forty-eight weeks of instruction in the basic science core spans the freshman year and fall semester of the sophomore year. During this period students are instructed in the basic sciences that undergird clinical medicine. Emphasis is placed on that body of knowledge common to all types of medical practice, avoiding the minute details relevant only to individual specialties. Comprehensive clinics, seminars in Behavioral Science and the elective faculty tutorial program provide for the first year medical student clinical contacts, an awareness of social, cultural and psychologic factors affecting health and illness, and insight into the major issues influencing the practice of medicine.

Clinical Science Core

The clinical core extends from January of the sophomore year until December of the junior year. During this twelve-month period each student receives twelve weeks of instruction in medicine, twelve weeks of instruction in surgery, eight weeks in pediatrics, eight weeks in obstetrics and gynecology, and eight weeks in psychiatry. There will be a brief summer vacation. During this year stu-

dents work within the hospitals and clinics and instruction is based on the care of patients.

Major Program

The Major Program extends from January of the junior year until graduation in May of the following year. This period is divided into 16 rotations of approximately one month duration. The Major Program enables each student to select that course of study best suited to his career objectives. Majors are offered in each of the preclinical sciences and Medicine, Surgery, Obstetrics and Gynecology, Pediatrics, and the Neurological Sciences and Psychiatry.

An integral part of each clinical major is a review and extension of basic science relevant to that discipline. Each major includes a limited number of required clinical and/or laboratory experiences as well as elective rotations. These electives are not restricted to the discipline in which the student is majoring and may include experiences in approved programs outside of Burlington. Each of these programs has sufficient flexibility to meet the interests and goals of each student. During the 1971-72 academic year, for instance, students with career goals in family practice selected major programs in Medicine, Pediatrics and Surgery, while those with future careers in Psychiatry selected major programs in Medicine and Neurological Sciences and Psychiatry, and so forth. A system of faculty advisers has been developed to counsel each student on a one-to-one basis throughout the planning and course of his major program.

Although the majority of students elect a clinical major, students so desiring may commit the full Major Program to study in the preclinical sciences. While these programs are individualized, it is expected that graduate study, research and a thesis will form the basis for each. Qualified students may enroll in the Graduate College as candidates for the Master of Science degree while fulfilling the requirements of the M.D. degree within the Major Program.

Students attending the University of Vermont College of Medicine should anticipate spending variable periods of time away from Burlington in the course of pursuing their required training.

V The Graduate College

The purpose of the Graduate College is to serve the needs of the college graduate who desires a broader and more thorough knowledge of scholarship and research in his chosen field. The College offers the following programs leading to the Master's degree and to the degree of Doctor of Philosophy. Each student is expected to be familiar with the general regulations and procedures of the Graduate College, and with the specific degree requirements in his chosen field of study. *For detailed information refer to the Graduate College Bulletin available from the Graduate College Office, 335 Waterman Building.*

Master of Arts

Programs are offered in the following fields:

Communication	German	Music
Economics	Greek	Philosophy
English	History	Political Science
French	Latin	Psychology
Geography	Mathematics	Spanish

Master of Science

Programs are offered in the following fields:

Agricultural Economics	Economics of Natural	Microbiology
Anatomy	Resource Planning	Pathology
Animal Sciences	Electrical Biophysics	Pharmacology
Animal Pathology	Electrical Engineering	Physics
Biochemistry	Forestry	Physiology and Biophysics
Biomedical Engineering	Geology	Plant and Soil Science
Biostatistics	Home Economics	Speech Pathology
Botany	Mechanical Engineering	Zoology
Chemistry	Medical Microbiology	
Civil Engineering	Medical Technology	

Master of Arts in Teaching

This degree is appropriate for teachers who are interested primarily in increasing their knowledge of their subject matter fields and thereby the effectiveness of their classroom instruction. Programs are offered in the following fields:

Agriculture	Geology	Latin
Botany	German	Mathematics
Chemistry	Greek	Music
English	History	Physics
French	Home Economics	Spanish
Geography	Industrial Education	Zoology

Master of Science for Teachers

This degree is designed primarily for secondary school teachers who wish to strengthen their backgrounds in their subject matter field, and who desire flexibility in choosing courses at levels best suited to their needs. Programs are planned on an individual basis.

Mathematics

Biology (Botany & Zoology)

Physical Sciences (Chemistry & Physics)

Master of Education

The master of education degree is intended to give those who work in education the kind of background and professional preparation needed for leadership in teaching and functions related to it. Programs are planned on an individual basis with special attention to such fields as:

Administration	Reading and Language	Special Education
Foundations of Education	(Elementary and Secondary)	Student Personnel Services in
Occupational and Practical	School Counseling	Higher Education
Arts Education	(Elementary and Secondary)	Teacher Education

Master of Business Administration

Study leading to the degree of Master of Business Administration is designed to provide opportunity for the individual to develop knowledge and understanding in a wide range of business activities that will provide foundation for growth and success in a business career. Programs are planned on an individual basis.

Master of Extension Education

This degree is designed to provide opportunity for those who work in non-school educational and counseling programs to develop knowledge and understanding in activities related to program management and educational methodology.

Programs are planned on an individual basis with special attention to fields such as:

Agriculture	Family Centered Services
Home Economics	Business and Industry
Youth Organizations	

Doctor of Philosophy

Programs are offered in the following fields:

Anatomy	Electrical Engineering	Physics
Animal Sciences	Mathematics	Physiology and Biophysics
Biochemistry	Mechanical Engineering	Plant and Soil Science
Botany	Microbiology	Psychology
Chemistry	Pharmacology	Zoology

Fifth Year Certificate in Education

A special fifth year program culminating in a certificate of advanced study is offered by the Department of Education for students who wish to work beyond the bachelor's degree. It is especially designed to meet the needs of teachers who are developing new teaching fields, for advanced students who are meeting requirements for state certification, and for experienced teachers who desire flexibility in choice of courses at both graduate and undergraduate levels. Information about the certificate program may be obtained by contacting the Dean of the College of Education.

Concurrent Degrees

Post-sophomore fellows in medicine are permitted to use credit from appropriate medical courses toward an M.S. or a Ph.D. They are enrolled in the Graduate College for one or more years to pursue research and enroll in such courses as would normally not be included within a medical program. Such persons, therefore, are working toward an M.D. and M.S. or Ph.D., but completion of each degree may occur at a different time.

All courses for which graduate credit is received at UVM in a master's degree program, whether a master's degree is received or not, may be applied toward a Ph.D. at UVM provided they are appropriate for the Ph.D. program.

No provision is made for a person to employ the same credit to satisfy two master's degrees at the University of Vermont.

V The Environmental Program

The Environmental Program is an interdisciplinary effort to examine the quality of our environment and the causes for its deterioration. Students and faculty from each of the University's colleges study and work together both on the campus and in the community on current and future environmental problems. Participants in the Environmental Program's activities explore the interaction of man with his environment and examine means whereby constructive societal change can be accomplished.

The Environmental Program is new on the campus and its educational and research activities at present are incompletely defined. An interdisciplinary "core" course (EP 1 and 2) is designed as an introductory experience and a prerequisite for more advanced studies in a variety of disciplines. This course represents the effort and contributions of faculty members having diverse skills and backgrounds. During the last two years of their college experience, students have the opportunity to work off the campus on community problems under the guidance of faculty preceptors. Action oriented research projects which challenge the imagination of the student are envisioned.

A Director assisted by an Executive Committee comprised of faculty and students oversee the activities of the Environmental Program. It is centered in the Bittersweet House where students are invited to visit and talk with the Staff regarding their interests, ideas, and future plans. Although a curriculum leading to a degree in environmental studies remains to be developed, the student has a breadth of options in choosing study programs which satisfy his or her educational goals.

V Continuing Education

The University, through Continuing Education, aims to broaden the horizon of those who have not attended college, to afford an opportunity for those who have attended college and subsequently wish to keep in touch with academic thought in their favorite fields or to gain information about subjects which were not studied in college, and to provide undergraduate opportunities in addition to the regular classroom experience.

The Summer Session

Summer Session offers courses on both the graduate and undergraduate level in many subjects, including agriculture, art, astronomy, botany, chemistry, classics, dramatic art, economics, education, English, French, geography, German, history, home economics, journalism, library science, mathematics, music (instrumental and vocal), philosophy, physical education, physics, political science, psychology, reading, sociology, Spanish, speech and zoology.

The offerings are diversified to meet the needs of the following various groups of students: those with adequate preparation who desire courses leading to a bachelor's degree; those with adequate preparation who wish to do graduate work for the master's degree; principals and superintendents of schools who desire fundamental or specialized courses in the fields of educational administration and supervision; teachers in elementary or secondary schools who seek credit toward state teachers' certificates, or who desire to broaden their knowledge of special subjects; persons who desire college level courses for self-improvement. Students must have sufficient maturity and background to profit from the courses in which they enroll.

It is recommended that any regularly matriculated student at the University of Vermont obtain prior approval from his academic dean for any courses to be taken in the Summer Session. The purpose of this recommendation is to insure such courses are appropriate for the degree for which the student is working.

The master's degree in several, but not all, areas may be earned through work in the Summer Session. All students desiring graduate credit for courses taken in the Summer Session must secure the approval of the Dean of the Graduate College at the time of registration. Enrollment in courses for graduate credit does not imply admission to the Graduate College. Fuller details on available courses and programs will be sent on request by the Director of the Summer Session.

Evening Division

Continuing education for adults in the State of Vermont is provided under the Evening Division Program offered by the University. Members of the faculty at

the University and others, working under temporary appointment, offer evening or extension courses in arts and sciences and education. A variety of courses is presented in evening sessions on campus throughout the college year. Some of these may be taken for credit while others are non-credit and are designed for the adult who is interested in continuing his education for the pleasure of self-improvement.

Courses are given in towns and cities throughout the state wherever a group of ten or more individuals register for a course.

Arrangements for Evening Division courses are made through the Evening Division, Waterman Building. Length of courses varies from ten to fifteen weeks.

It is recommended that any regularly matriculated student at the University of Vermont obtain prior approval from his academic dean for any courses to be taken in the Evening Division. The purpose of this recommendation is to insure such courses are appropriate for the degree for which the student is working. All persons desiring graduate credit must secure the approval of the Dean of the Graduate College at the time of registration.

Non-Degree Student Enrollment

Through Continuing Education Non-Degree students have an opportunity to enroll in courses offered in the day program. Non-degree students are those who have presented minimum credentials and are permitted to enroll in one of the colleges of the University to undertake course work for a purpose other than the earning of a degree.

Previously earned credits for non-matriculated students who later matriculated will be evaluated and included in the particular degree program if pertinent.

Undergraduate Non-degree Students, those seeking only undergraduate credit for course work taken, apply for approval to the Division of Continuing Education which will act as their college office.

Graduate Non-degree Students, those seeking graduate credit, must register through the Graduate College.

Selection of courses for those having long range plans of earning a degree should be made on the basis of information given in this catalog. Students interested in making a formal application for admission to the University should contact the office of Admissions, 344 Waterman Building.

All non-degree students who would like assistance in planning educational programs and selecting courses should contact the Division of Continuing Education at 357 Waterman Building. (telephone 656-2085)

Conferences and Institutes

Conference activity is a rapidly increasing part of University life. Both throughout the regular college year and during the summer, many conference groups make use not only of university classroom and auditorium facilities but also of university dormitories and dining service. Groups interested in arranging for meetings or conferences at the University should contact the Conferences and Institutes Office, Waterman Building. This office also coordinates the Speakers Bureau through which University personnel are made available to organizations outside the campus.

V Courses of Instruction

The University reserves the right to change these course offerings at any time.

The departments and areas of instruction are arranged alphabetically, and the college in which each is located is indicated.

A student who lacks the stated prerequisites for a course, but is otherwise qualified to take it, may be permitted to enroll by the department.

Courses numbered from 1 through 99 are elementary and intermediate courses.

Those numbered from 100 through 199 are advanced undergraduate courses. They usually have at least one year of prior work in that discipline as a prerequisite. They may be taken as minor courses, but in some departments only a limited number may be taken as major courses. They are not ordinarily available for graduate credit.

Courses numbered from 200 through 299 are relatively more advanced courses for undergraduates which may also be taken for graduate credit by graduate students. They usually require at least two years of prior work in that and related disciplines. To obtain graduate credit the graduate student generally is expected to meet higher qualitative or quantitative expectations than the undergraduate student.

Two numbers with a comma between (17, 18) indicate that the separate semester courses may be taken independently for credit.

Two hyphenated numbers (17-18) indicate that the semester courses may not be taken independently for credit and, unless otherwise stated, they must be taken in the sequence indicated.

The number of credit hours *per semester* is stated in each course description.

Odd-numbered courses are generally offered the first semester; even-numbered courses are generally offered the second semester; variations from this arrangement may be indicated by the Roman numeral I for the first semester or II for the second semester.

The form (2-3) immediately following the course title indicates the number of class hours respectively of lecture and of laboratory.

Anatomy

COLLEGE OF MEDICINE

Professor Young (Chairman); Associate Professors Freedman and Wells; Assistant Professors Horst and Weidman; Instructor Finn; Demonstrator Boushey.

102 ANATOMY FOR PHYSICAL THERAPISTS (2-9) Study of the organization of the human body, emphasizing the principles of structure, methods of analysis, and detailed attention to specific regions. The musculoskeletal, integumentary, respiratory, cardio-vascular and peripheral nervous systems will be given special emphasis. Laboratory experiences will include: detailed dissections of certain regions; study of selected microscopic preparations, models, prosections, cross-sections, radiographs and skeletal materials; and will direct the student's attention to salient topographic anatomy by visualization and palpation. Departmental permission. Six hours. Staff.

Animal Pathology

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professor Bolton (Chairman); Associate Professors Murray and Henry Doremus; Assistant Professor Helen Doremus; Adjunct Associate Professor Wadsworth.

105 ANIMAL ANATOMY Structure of the various parts of the animal body with emphasis on cattle, swine and horses. Three hours. Dr. Murray.

106 ANIMAL DISEASES Fundamentals of disease recognition and prevention in domestic animals. Special disease problems in cattle and horses with emphasis on control measures. *Prerequisite:* 105 recommended. Three hours. Dr. Murray.

107-108 LABORATORY ANIMAL TECHNIQUES (2-2) Laboratory procedures used in the examination of blood, fecal, urine, milk, and tissue specimens. Preparation of tissue sections. *Prerequisite:* microbiology and biochemistry 55 and a course in organic chemistry. Three hours. Dr. Helen Doremus.

110 WILDLIFE DISEASES Common diseases and parasitic problems of large game animals, small fur-bearing animals, waterfowl and game birds. Autopsy techniques and diagnostic laboratory procedures. *Prerequisite:* 2 courses in biology or zoology. Three hours. Dr. Bolton. Alternate years, 1972-73.

197, 198 SENIOR RESEARCH Work on a research problem under the direction of a qualified staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* senior standing. Three hours. Staff.

217-218 LABORATORY ANIMALS (2-2) Life cycles, nutrition, housing, breeding, disease prevention, colony management, preoperative and postoperative care, and humane methods of handling. *Prerequisite:* microbiology and biochemistry 55 or medical microbiology 201, chemistry 131, 132. Three hours. Dr. Henry Doremus.

220 LABORATORY ASSIGNMENTS Rotating assignments in the Animal Pathology Laboratory and Division of Animal Services under the guidance of the professional staff. *Prerequisite:* 107, 217. Three hours. Staff.

Animal Sciences

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professors Atherton, Balch, Smith (Chairman), and Welch; Associate Professors Carew, Duthie, Nilson, and Simmons; Assistant Professor Foss; Adjunct Associate Professors Mercia, and Woelfel, and Adjunct Assistant Professor Gibson.

2 **INTRODUCTORY ANIMAL SCIENCE** Fundamental principles of anatomy, physiology, nutrition, breeding and management of animal species important in our agricultural economy. Three hours. Mr. Smith and staff.

33 **INTRODUCTORY DAIRY TECHNOLOGY (2-2)** Basic information on milk and milk products and application of this information in laboratory exercises. Three hours. Mr. Duthie.

43 **FUNDAMENTALS OF NUTRITION.** A comprehensive study of specific nutrients in terms of their availability, function, utilization, and requirements in mammalian species. Three hours. Staff.

44 **DAIRY CATTLE SELECTION (2-3)** Fundamental principles of dairy cattle selection and breeding. Three hours. Mr. Gibson. Alternate years, 1972-73.

104 **FOOD TESTING AND QUALITY CONTROL (2-2)** Composition and properties of basic food materials. Standard methods of bacteriological and chemical analysis and their significance in product quality. Three hours. Mr. Atherton.

109 **FOOD MICROBIOLOGY (2-3)** Desirable and undesirable activities of microorganisms in foods. Laboratory methods in quality control. Microbial contamination, food spoilage, and food-borne disease. Three hours. Mr. Atherton.

114 **MANUFACTURED DAIRY PRODUCTS (2-3)** Methods and technical problems in manufacturing milk products such as cheese, butter, evaporated and dry milks. *Prerequisite:* 33, junior standing. Three hours. Mr. Nilson. Alternate years, 1973-74.

121 **SENSORY EVALUATION OF FOODS (1-4)** Taste and odor as basic components of flavor, sensory tests for consumer acceptance studies and practical training in flavor identification. Three hours. Mr. Duthie. Alternate years, 1972-73.

153 **MILK PROCESSING (2-2)** Technical aspects of processing fluid milk and fluid milk products. *Prerequisite:* departmental permission. Three hours. Mr. Nilson. Alternate years, 1972-73.

158 **INTRODUCTION AVIAN BIOLOGY (3-3)** Designed for students with general interests in biology. Topics-Evolution, comparative structure and function, behavior, migration and orientation, flight, identification, population regulation. Four hours. Mr. Foss.

160 **ANIMAL BREEDING (2-3)** Theory and application of genetic principles of breeding of livestock. *Prerequisite:* 2. Three hours. Mr. Balch. Alternate years, 1973-74.

170 **GENERAL PHYSIOLOGY.** An intermediate course concerned with the function of the organ systems in the mammalian body. This course is especially designed for the biology student to increase his knowledge of animal functions at the organ system level. *Prerequisites:* Animal Pathology 105 or equivalent. Three hours. Messrs. Foss and Simmons.

177 **ADVANCED LIVESTOCK PRODUCTION (2-3)** Organization and operation of livestock enterprises. Theory and application of feeding, breeding and management programs and principles. *Prerequisite:* 43; junior standing. Three hours. Mr. Welch. Alternate years, 1973-74.

187, 188 **LIGHT HORSE PRODUCTION AND MANAGEMENT (2-3)** The problem of light horse production. Application of the principles of selection, management and horsemanship. *Prerequisite:* 187 for 188; junior standing. Three hours. Mr. Balch. Alternate years, 1972-73.

190 **POULTRY SCIENCE** Scientific principles employed in poultry enterprises including evolution, genetics, breeding, incubation, hatching, brooding and rearing, nutrition, pathology, housing, and marketing. *Prerequisites:* 43 and 158; junior standing. Three hours. Mr. Carew. Alternate years, 1973-74.

197, 198 **UNDERGRADUATE RESEARCH** Research activity under the direction of a qualified staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* junior standing and department permission. Three hours. Staff.

211 **ICE CREAM AND FROZEN DAIRY PRODUCTS (2-3)** Fundamentals of ice cream manufacturing, the physico-chemical and biological factors involved; calculation of formulas; sherbets and specialties; merchandising; sanitary control. *Prerequisite:* 104; credit or concurrent enrollment in 109; junior standing. Three hours. Mr. Nilson. Alternate years, 1973-74.

246 **ADVANCED NUTRITION** (See home economics 246) Three hours. Messrs. Keyser and Welch.

249 **NUTRITION SEMINAR** (See home economics 249) Three hours. Miss Morse and Mr. Welch.

251 **ADVANCED DAIRY CATTLE MANAGEMENT (2-3)** Organization and operation of dairy enterprises. Theories and methods of application of feeding, breeding, and management programs and principles. *Prerequisite:* 43. Three hours. Mr. Woelfel. Alternate years, 1973-74.

256 **DAIRY PLANT MANAGEMENT (2-3)** Organization and operation of milk processing and manufactured milk products plants. *Prerequisite:* 153, Ag. Ec. 62; junior standing. Three hours. Mr. Nilson. Alternate years, 1972-73.

271 **ENDOCRINOLOGY (2-2)** Anatomy, physiology, glandular interrelationships, and assay methods of the endocrine glands and their hormones. *Prerequisite:* departmental permission. Three hours. Mr. Simmons.

275 **PHYSIOLOGY OF REPRODUCTION AND LACTATION (2-2)** Fundamental principles of the physiology of reproduction and lactation with the primary emphasis on farm animals. Three hours. Mr. Simmons. Alternate years, 1972-73.

281, 282 **ANIMAL AND DAIRY SCIENCE SEMINAR** Reports and discussions of problems and special investigations in selected fields. One-three hours. Maximum credit two hours senior, three hours graduate. Staff.

291 **SPECIAL PROBLEMS IN ANIMAL AND DAIRY SCIENCE** Reading, discussion, and special laboratory investigation in the field of animal and dairy science. *Prerequisite:* departmental permission. A student may enroll more than once for a maximum of six hours. Staff.

294 **HISTORY OF NUTRITION** (See home economics 294). One hour. Miss Morse.

V Anthropology

COLLEGE OF ARTS AND SCIENCES

Associate Professor Haviland; Assistant Professors C. Pastner, S. Pastner, Magnarella, Woolfson (Chairman); Instructor Basa.

Anthropology

21 THE CULTURES OF MAN The culture concept; the lifeways of non-Western societies of varying social complexity. Three hours. Staff.

24 WORLD PRE-HISTORY The origins and antiquity of culture; the nature of archaeological data and interpretation. Three hours. Miss Basa.

26 PHYSICAL ANTHROPOLOGY An introduction to the study of the evolution and racial differentiation of man. Three hours. Mr. Haviland.

ANTHROPOLOGY 50 LANGUAGE IN CULTURE This course is designed to provide background in linguistic anthropology. Three hours. Mr. Woolfson.

ANTHROPOLOGY 131 PRIMITIVE RELIGION (See Religion 131).

160-170 CULTURES. Three hours. These courses are designed to provide an examination of the culture areas and types of the following peoples:

161 PEOPLES OF THE AMERICAS. Mr. Haviland.

162 PEOPLES OF AFRICA. Miss Basa.

163 PEOPLES OF SOUTHEAST ASIA AND OCEANIA. Staff.

165 PEOPLES OF JAPAN, CHINA, AND INDIA. Mr. Pastner.

166 PEOPLES OF THE MIDDLE EAST. Mr. Magnarella.

170 PASTORAL PEOPLES. Mr. Pastner.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

221 CULTURE AND PERSONALITY The cross-cultural comparison of personality development; the problem of delineating modal personality types. *Prerequisite:* 21, Sociology 22, and one 100 level course in sociology or anthropology. Three hours. Mr. Steffenhagen.

225 CURRENT ANTHROPOLOGICAL THEORY Survey and analysis of 20th century theories of cultural evolution, diffusionism, functionalism, and the American historical school. *Prerequisite:* 21 plus one of following: 161, 162, 163, 165 or 170. Mr. Pastner.

228 SOCIAL ORGANIZATION Evaluation of the comparative method in anthropology. *Prerequisite:* 21, and 161, 162, 163, 165 or 170. Three hours. Staff.

229 POLITICAL AND ECONOMIC ANTHROPOLOGY This course will focus on issues in the analysis of traditional exchange and subsistence systems and the ways these relate to interest-based, or political behaviors. *Prerequisite:* 21 and one of the following: 161, 162, 163, 165 or 170. Three hours. Mr. Pastner.

262 CULTURAL GEOGRAPHY (Same as geography 262)

283 **CULTURE CHANGE** The data and theories of cultural dynamics. *Prerequisite:* 21 and one of the following: 161, 162, 163, 165, or 170. Three hours. Mr. Woolfson.

284. **URBAN ANTHROPOLOGY.** A consideration of anthropological concepts and methods for the study of social life in towns and cities. *Prerequisite:* 21 and a course at the 100 level. Three hours. Mr. Magnarella.

290 **SEMINAR** *Prerequisite:* twelve hours of anthropology and senior standing. Three hours. Staff.

295-6. **SPECIAL TOPICS.** *Prerequisite:* 21 and a course at the 100 level

Area and International Studies

COLLEGE OF ARTS AND SCIENCES

Executive Committee: Professors Daniels, Dellin (Chairman), Gould, Miles, Seybolt, Staron and True.

Asian Studies: Professors Alnasrawi, Andrews, Brennerman, Brewer, Flanders, Gussner, Leinback, Little, Martin, Nuquist, Pastner, Paden, Roland, Seybolt (Director), Swanson, Wong and Yadav

Canadian Studies: Professors Geno, Haugen, Kohler, Laber, Metcalfe, Miles (Director), Miller, Muller, Rivard, Woolfson and Young

Latin American Studies: Professors Doolan, Gade, Gould, Haviland, Murad, Parker, Simon, True (Director), Ugalde, Weiger, Wesseling, and Zarate

Russian and Eastern European Studies: Professors Basa, Daniels, Dellin, Flannery, Meeks, Nalibow, Pacy, Paganuzzi and Staron (Director)

General and Other Colleges: Professors Barnum, Felt, Hilberg, Kahn, Mabry, Magnarella, Sargent, Schmokel, Shiman, Stone, Tremblay, Vogelmann, Webster, Wheeler and Wilbert

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

297, 298 **SEMINAR** Conducted by a team of area specialists and covering selected topics through interdisciplinary and comparative approaches. *Prerequisite:* permission by the executive committee of Area Studies. Other area courses are offered by the individual academic departments. For specific requirements for each area, consult the Director of the appropriate program.

Art

COLLEGE OF ARTS AND SCIENCES

Professor R. Janson (Chairman); Associate Professors J. Davison and Mills; Assistant Professors Aschenbach, W. Davison, Hewitt, Lipke, Owre, Roland; Instructors Fengler, Higgins, Okino, Sherman, Walker.

1, 2 INTRODUCTION TO STUDIO Three hours. Staff.

3 INTERMEDIATE STUDIO I Primary two-dimensional media; surface and imagery utilizing aspects of painting, drawing, printmaking and photography. *Prerequisite:* 1 or 2. Three hours. Hewitt, Davison and Sherman.

4 INTERMEDIATE STUDIO II Primary three-dimensional form and structure utilizing aspects of sculpture, ceramics and other manipulative/constructional media. *Prerequisite:* 1 or 2. Three hours. Aschenbach, Owre and Okino.

5, 6 ART HISTORY Painting, sculpture, and architecture in the western world. First semester: Egyptian through Gothic; second semester: Renaissance to the present. *Prerequisite:* 5 for 6. Three hours. Staff.

11 INTRODUCTION TO FINE METAL CRAFTS Basic creative experiences in enamels and silver jewelry to develop individual ability in design, appreciation and technical skill. *Prerequisite:* sophomore standing. Three hours. I and II. Mrs. Mills.

13 INTRODUCTION TO CERAMICS Basic design and practice in ceramics. Hand coiled and thrown forms, firing and glazing. *Prerequisite:* junior standing. Three hours. I and II. Mr. Okino.

21, 22 DRAWING Three hours. I, II. Mr. Owre.

41 INTRODUCTION TO SCULPTURE *Prerequisite:* junior standing. Three hours. I and II. Mr. Aschenbach.

51 GREEK ART History of art in Greek lands in ancient times. Emphasis on sculpture, architecture, and vase painting. *Prerequisite:* sophomore standing. Three hours. Miss J. Davison.

52 ROMAN ART Development of Roman art styles out of Greek forms. Emphasis on wall painting. Augustan official sculpture, later imperial architecture, mosaic. *Prerequisite:* sophomore standing. Three hours. Staff.

54 MODERN ART Painting and sculpture from French Impressionism to the present; emphasis on European influences. *Prerequisite:* sophomore standing. Three hours. Mrs. Roland.

102 MEDIEVAL ART Art and architecture in western Europe from the Early Christian to early 15th century. Emphasis on Romanesque and Gothic. *Prerequisite:* 6 or 51 and 52. Three hours. Mrs. Roland.

103 RENAISSANCE ART Painting, sculpture and architecture in Italy 1400-1600. *Prerequisite:* 6 or 51 and 52. Three hours. Mrs. Fengler.

104 BAROQUE ART European art and architecture, 1600-1750. Studies of original works in the Museum collection. *Prerequisite:* 6 or 51 and 52. Three hours. Mrs. Roland.

105 ROCOCO AND ROMANTIC ART European architecture, sculpture, and painting, circa 1750-1850, and the origins of the modern movement. *Prerequisite:* 6 or 51 and 52. Three hours. Mrs. Fengler.

106 MODERN ARCHITECTURE Monuments, masters and movements since 1850. Visits with architects and to modern buildings in the area. *Prerequisite:* 4 or 6. Three hours. Mr. R. Janson.

107 AMERICAN PAINTING Painting in America from Colonial times to the twentieth century. Use of the Fleming and Shelburne Museum collections. *Prerequisite:* 6. Three hours. Mr. Lipke.

108 AMERICAN ARCHITECTURE The Colonial period to Frank Lloyd Wright. Research on buildings of historical interest in the area. *Prerequisite:* 6. Three hours. Mr. R. Janson.

111, 112 FINE METAL CRAFTS Advanced techniques in enamels and silver jewelry. Independent work emphasizing design and skill. *Prerequisite:* 11 and 1 or 2. Three hours. Mrs. Mills.

113, 114 CERAMICS Advanced techniques in throwing and hand building. Clay and glaze technology, kiln theory and construction. Independent work in ceramic design and execution. *Prerequisite:* 13 or 4. Four hours. Mr. Okino.

121, 122 DRAWING AND PAINTING *Prerequisite:* 3 and 21. Three hours. Mr. Hewitt.

131, 132 PRINTMAKING: INTAGLIO Methods and materials in intaglio printing, etching and woodcut, stressing design and technical control. *Prerequisite:* 3 and permission; 131 for 132. Four hours. Mr. W. Davison.

133, 134 PRINTMAKING: PLANOGRAPHIC Methods and materials in planographic printing, lithography and silk screen, stressing design and technical control. *Prerequisite:* 3 and permission; 133 for 134. Four hours. Mr. W. Davison.

141, 142 SCULPTURE *Prerequisite:* 41 or 4. Three hours. Mr. Aschenbach.

151 VISUAL ENVIRONMENT An exploration of public spaces, structures, architectural detail, landscaping, roadways, lighting, etc. Field trips, meetings with planners and architects, projects. *Prerequisite:* 3 or 4. Three hours. Mr. Owre.

161 PHOTOGRAPHY An introduction to photographic processes as methods of seeing, on visual discovery through informed manipulation of materials. *Prerequisite:* 3. Three hours. Mr. Higgins.

183, 184 SEMINAR IN ART AND EDUCATION A workshop exploring the methods, place and purpose of art in the educational experience. Students will plan and conduct childrens classes as part of their studies. *Prerequisites:* six hours studio, to include 3 or 4 or Education 140, and permission. Three hours. Mrs. Walker and Miss Sherman.

185, 186 ART HISTORY SEMINAR A museum course dealing with selected topics in art history. First semester: research and criticism; second semester: an exhibition undertaken by the class. *Prerequisite:* six hours advanced art history and permission. Three hours. Staff.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READING AND RESEARCH Independent projects in either art history or studio. *Prerequisite:* departmental permission. Three hours. Staff.

207 STUDIES IN AMERICAN ART Selected areas of American art and design, particularly as represented in the Fleming and Shelburne Museums. *Prerequisite:* By permission to advanced students of Art History, American history or literature. Three hours. Mr. Janson and Mr. Lipke.

210 STUDIES IN MODERN ART Selected topics in 19th and 20th century art, stressing individual research and reports. *Prerequisite:* 105 or 6 and 54, and instructor's permission. Three hours. Mrs. Roland and Mr. Lipke.

281, 282 STUDIO SEMINAR Advanced studies, combining independent

projects and group critiques in a particular area. *Prerequisite:* six hours advanced studio and permission. Three or six hours. Mr. Hewitt and staff.

ART EDUCATION The department offers a broad fields major in visual arts in education. For requirements in this program and additional courses in art and education turn to the section on the College of Education.

Biochemistry

COLLEGE OF MEDICINE

Professor Melville (Chairman); Associate Professors Lamden, Meyer and Woodworth; Assistant Professors Hart, Schofield, Thanassi, Willard and Wuthier; Instructor Ishikawa.

102 ANALYTICAL BIOCHEMISTRY (2-4) Lectures, conferences, and laboratory exercises concerned with the theory and techniques of importance in the quantitative analysis of biological materials. Primarily for students of medical technology but open to others with permission of the department chairman. *Prerequisite:* Chemistry 1-2. Four hours. Drs. Lamden and Woodworth.

111-112 BIOCHEMISTRY (2-4) Lectures, conferences, and laboratory exercises concerned with mammalian biochemistry, particularly as it relates to man. Topics include the chemistry and metabolism of carbohydrates, lipids, proteins, and nucleic acids; enzymes, digestion, and biological oxidations; blood, hemoglobin, plasma proteins, and iron metabolism; respiration, acid-base balance, and mineral metabolism, hormones and control mechanisms. Laboratory work involves the application of quantitative biochemical principles to the analysis of body constituents. Primarily for students of medical technology but open to others with permission of the department chairman. *Prerequisite:* 102 or quantitative chemistry; organic chemistry. Four hours each semester. Dr. Hart.

191, 192 UNDERGRADUATE RESEARCH Participation in a research program currently being pursued by a faculty member of the Department. A written report is due at the end of each semester. *Prerequisite:* Chemistry 1, 2 or 11, 12. Some programs may require additional courses in chemistry. Credit as arranged, up to 4 hours per semester. Staff.

Botany

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professors Dodge,¹ Gershoy,² Hyde (Chairman), Klein, Marvin, Sproston, Taylor and Vogelmann; Associate Professors Cook and Etherton; Assistant Professors Wilson and Worley; Adjunct Assistant Professor Jagels.

1. Visiting professor.
2. Emeritus.

Biology

1, 2 PRINCIPLES OF BIOLOGY (3-3) Introduction to the structure, functions, and evolution of animals and plants. Emphasis on concepts important for advanced study in a Life Science and for understanding the biological world of which man is a part. *Prerequisite:* 1 for 2. Four hours. Botany and Zoology Staffs.¹

3 BIOLOGY AND MAN An introduction for nonscience majors. Selected biological processes relevant to man and his world, problems resulting from man's interaction with his environment such as overpopulation and environmental pollution; biological principles and concepts necessary for an understanding of these problems. Three hours. Botany and zoology staffs.¹

Botany

4 INTRODUCTION TO PLANT BIOLOGY (3-3) An introduction to structure, function, and reproduction of vascular plants in terms of the dynamics of plant life. Practical implications of basic botanical information in the applied plant sciences. Four hours. Staff.¹

101 GENETICS (see Zoology 101.)

104 PHYSIOLOGY OF THE PLANT BODY (3-3) Study of the plant as a whole, growth and development, water and mineral relations, environmental factors, and regulatory processes. *Prerequisite:* 4 or Biology 1, 2. Four hours. Mr. Etherton.

105 DEVELOPMENTAL PLANT STRUCTURE (2-4) Structure and reproductive patterns in major plant groups and their physiological and evolutionary implications. *Prerequisite:* 4 or Biology 1, 2. Four hours, Mr. Cook.

109 SYSTEMATICS AND PHYLOGENY (1-4) Classification; evolution of flowering plants; characterization and recognition of major families; species and generic concepts; biosystematics; taxonomic keys; preparation of herbarium specimens. *Prerequisite:* 4 or Biology 1, 2. Three hours. Mr. Vogelmann.

112 FOREST PATHOLOGY (2-2) The principal diseases of forest trees and deterioration of forest products, with emphasis on prevention and control. *Prerequisite:* 4 or Biology 1, 2. Three hours. Mr. Wilson.

117 PLANT PATHOLOGY (2-4) Diagnosis, life history, and control of plant diseases caused by fungi, viruses, bacteria and nematodes. *Prerequisite:* 4 or Biology 1, 2. Four hours. Mr. Sproston.

151 PLANTS AND MAN The influence of plants on exploration, migration and development of civilizations. The botanical features which contribute to usefulness for food, drugs, and fiber. *Prerequisite:* 4 or Biology 1, 2. Three hours. Mr. Taylor.

160 PLANT ECOLOGY Analysis of the environment and effects on plants; interrelationships between plants; ecologic adaptations. *Prerequisite:* 4 or Biology 1, 2. Three hours. Mr. Worley.

193, 194 HONORS IN BOTANY

195 SPECIAL TOPICS

1. Credit will not be given for both Biology 1 and Botany 4. Credit will not be given for both Biology 1, 2 and Biology 3. Botany and Zoology majors will not receive credit for Biology 3.

197, 198 UNDERGRADUATE RESEARCH AND APPRENTICESHIPS Individual projects under the direction of a faculty member. The project may involve original research, readings, or apprenticeships. *Prerequisite*: junior standing. Three to six hours.

205 MINERAL NUTRITION OF PLANTS (see Plant and Soil Science 205).

207 WATER RELATIONS OF PLANTS (see Forestry 207).

210 PLANT RESPONSE TO ABIOTIC TOXICANTS Examples of damage and current hypotheses relating to injury response. Interactions of biotic and abiotic factors; air and water pollutants; nutritional disorders; pesticides. *Prerequisites*: 104 or Zoology 103. Three hours. Mr. Wilson. Alternate years, 1972-73.

212 PHYSIOLOGY OF PLANT PATHOGENESES Role of growth regulators, enzymes, polysaccharides, and toxins in metabolism, photosynthesis, growth, and other physiological processes in diseased plants. *Prerequisites*: 117, 104 or Microbiology and Biochemistry 201. Three hours. Mr. Wilson. Alternate years, 1973-74.

213 PLANT COMMUNITIES (2-2) Plant sociology; structure and organization of the plant community; sampling methods and analysis of data; climatic and edaphic factors; field work. *Prerequisite*: 109 or departmental permission. Three hours. Mr. Vogelmann. Alternate years, 1972-73.

232 BOTANY FIELD TRIP Trips to selected environments outside Vermont. Led by several faculty members representing different fields of Botany. Emphasis will be on overall, integrated approach to ecology, structure, and function. One hour. Staff. Christmas or spring vacation or end of school year.

241 ELECTRON MICROSCOPY (3-3) Basic knowledge of and experience with the techniques of electron microscopy and interpretation of electron micrographs. *Prerequisite*: an acceptable course in histology or cell structure. 4 credits. Mr. Jagels.

252 PLANT ANATOMY AND HISTOLOGY (2-4) Development of the organism and accompanying integration of cellular tissues. Ontogeny of vegetative tissues; modifications of the cell wall. *Prerequisite*: 4 or Biology 1, 2; junior standing. Four hours. Mr. Taylor. Alternate years, 1972-73.

253 FUNGI (2-4) Reproductive processes and classification of the common mushrooms, molds, and yeasts. Physiological studies; antibiosis. *Prerequisite*: Chemistry 131, 132 or departmental permission. Four hours. Mr. Sproston. Alternate years, 1973-74.

254 GENETICS AND CYTOGENETICS (2-2) Analysis of mendelian inheritance, recombination in higher plants and animals as well as microorganisms, chromosome aberrations, polyploidy. Gene action and introduction to molecular genetics. *Prerequisites*: 101 and eight additional hours of botany or zoology above 100. Three hours. Mr. Hyde. Alternate years, 1972-73.

256 CYTOLOGY (3-2) The dynamics of the protoplast; nuclear division, gamete formation and syngamy. Ultrastructure of cell organelles, nucleocytoplasmic interaction. *Prerequisite*: 101; Chemistry 131, 132. Four hours. Mr. Hyde. Alternate years, 1972-73.

257 PHYSIOLOGY OF THE PLANT CELL (3-2) Detailed study of photosynthesis, plant cell membrane function, and plant cell growth. *Prerequisites*: Botany 104, Chemistry 131, 132 or Chemistry 16, Physics 5, 6. Four hours. Mr. Etherton and staff. Alternate years, 1972-73.

259 PLANT GROWTH (2-4) The nutrition of plant cells, growth hormones, cyclic variation of environmental factors, morphogenesis. *Prerequisite:* 104, Chemistry 131, 132. Four hours. Mr. Marvin, Mr. Klein. Alternate years, 1972-73.

260 PHYCOLOGY (2-4) The morphology, classification, and general biology of the algae, with special consideration of the freshwater forms. *Prerequisite:* 105, or two courses in zoology or botany above 100. Four hours. Mr. Cook. Alternate years, 1973-74.

270 PERSPECTIVES IN BIOLOGY Biological rhythms, mimicry, holism, polarity, traumatic reversion, dichotomy, the common occurrence of the helix, and others. *Prerequisite:* junior standing, 12-15 credits in zoology or botany courses. Three hours. Mr. Sproston.

281, 282 BOTANY SEMINAR A topical seminar consisting largely of presentations of personal research by faculty and graduate students from within and outside the University. May be jointly sponsored with related departments. Required attendance of botany graduate students and seniors in botanical research programs. Without credit. Staff.

Chemistry

COLLEGE OF TECHNOLOGY

Professors Gregg, Flanagan, Kice (Chairman), Krapcho, Kuehne, and White; Associate Professors Whitcher and Wulff; Assistant Professors Allen, Brown, Strauss, and Weltin.

Note: Credit cannot be granted for: 1, 2 and also 11, 12; 3, 4 and also 1, 2; 140 and also 141, 142.

1, 2 INTRODUCTORY CHEMISTRY (3-3) The important principles, ideas and concepts of general chemistry. Either this course, or Chemistry 11, 12 should be elected by all students planning subsequently to take any 100 level course in chemistry. *Prerequisites:* 1 or 11 for 2. Four hours. Staff.

3 OUTLINE OF GENERAL CHEMISTRY (3-3) A one-semester course in the principles, ideas and concepts of general chemistry, with particular emphasis on those aspects of the subject of importance to the biological and health sciences. Four hours. Staff.

4 OUTLINE OF ORGANIC AND BIOCHEMISTRY (3-3) A brief introduction to some of the important and interesting aspects of organic and biochemistry. Credit cannot be granted for both Chemistry 4 and 16. *Prerequisite:* Chemistry 1, 3, or 11. Four hours. Staff.

7 EARTH, AIR, FIRE AND WATER (3-3) An introductory course intended for non-science majors. It deals with man's chemical understanding of his surroundings. Concepts of energy, structure, and change as related to the observable universe. Emphasis on understanding topics of current interest and on the chemical interpretation of biological systems. Four hours. Staff.

11, 12 GENERAL CHEMISTRY (3-6) Includes general experiments in elementary qualitative and quantitative analysis. Recommended for those concentrating in chemistry or physics. *Prerequisites:* one year of high school

chemistry and concurrent enrollment in Mathematics 11 or 13 for Chemistry 11. Chemistry 11 for 12. Five hours. Staff.

13, 14 **THE CHEMICAL BOND** Nature of interatomic and intermolecular forces. Stereochemistry, bond energies, and crystal structures are considered. *Prerequisite:* 1, 2 or 11, 12. One hour. Mr. Gregg.

16 **INTRODUCTORY ORGANIC CHEMISTRY (3-3)** A one-semester introduction to the more important and interesting aspects of organic chemistry. (Does not satisfy medical school entrance requirements regarding undergraduate preparation in organic chemistry.) Credit cannot be granted for both Chemistry 16 and 4. *Prerequisite:* Either Chemistry 1, 3, or 11. Four hours. Staff.

123 **QUANTITATIVE ANALYSIS (3-3)** Theory and practice of gravimetric and volumetric methods of analysis. Theoretical discussion of indicators, buffers, pH, etc. *Prerequisite:* 1, 2. Not open to students with credit for 11, 12. Four hours. Mr. Whitcher.

131, 132 **ORGANIC CHEMISTRY (3-3)** Organic chemistry for chemistry majors, premedical students, and those concentrating in the biological and physical sciences. *Prerequisite:* 1, 2 or 11, 12; 131 for 132. Four hours (may be taken without laboratory for three hours credit by chemistry majors who intend to enroll in 134 and 135). Messrs. Krapcho and Kice.

134 **ORGANIC CHEMISTRY LABORATORY (0-6)** Laboratory practice in organic synthesis with an emphasis on separation and purification procedures. Introduction to spectral methods of structure identification. *Prerequisite:* 131. Two hours. Mr. Krapcho.

135 **ADVANCED ORGANIC CHEMISTRY LABORATORY (0-6)** Chemical and physical methods of identifying organic compounds. Advanced synthetic and separation procedures. *Prerequisite:* 131, 134. Two hours. Staff.

140 **PHYSICAL CHEMISTRY FOR BIOLOGICAL SCIENCE STUDENTS** Aspects of physical chemistry most pertinent to work in the biological sciences: acid-base equilibrium, theory of solutions, thermodynamics and kinetics. *Prerequisite:* 2, physics 6. Three hours. Mr. Flanagan.

141, 142 **PHYSICAL CHEMISTRY** Elementary quantum chemistry, introduction to statistical mechanics, thermodynamics, properties of solutions and chemical kinetics. *Prerequisite:* 2 or 12; physics 6; mathematics 121 for 141. Three hours. Messrs. Weltin, Flanagan and Wulff.

201, 202 **ADVANCED CHEMISTRY LABORATORY (1-8)** Modern analytical, physical and synthetic techniques. Syntheses requiring advanced methods such as controlled atmosphere box, autoclave, photochemical reactor, etc. Selected basic physical chemistry experiments. Development of techniques used for measurement of a variety of phenomena, e.g. thermochemistry, kinetics, electrochemistry, spectroscopy. Students wishing to take one semester only may concentrate in a particular area of interest, such as instrumental analysis. *Prerequisite:* 11, 12 or 123; credit for or concurrent enrollment in 141 and 142. Four hours. Messrs. Allen, Brown, Flanagan and Wulff.

212 **ADVANCED INORGANIC CHEMISTRY** Structure, bonding, and reactions of inorganic compounds. Ionic compounds, the lanthanides; theories of acids and bases; electron-deficient bonding; covalent bond chemistry; simple models for structure prediction; introduction to crystal field theory; substitution reactions of transition metal complexes. *Prerequisite:* 142 or equivalent. Three hours. Messrs. Allen and Brown.

213 **ADVANCED INORGANIC CHEMISTRY** Application of symmetry concepts to inorganic chemistry; ligand field theory and electronic spectra; multiply-bonded systems; metal carbonyls; introduction to organometallic chemistry; biologically important inorganic complexes. *Prerequisite:* 212. Three Hours. Messrs. Allen and Brown.

223 **CHEMICAL INSTRUMENTATION** The design and usage of modern instruments to facilitate chemical research. Topics such as temperature measurement and control, pH measurement and control, pressure measurement and control, etc., will be discussed. Three hours. Staff. Offered as occasion warrants.

231 **PHYSICAL ORGANIC CHEMISTRY—PRINCIPLES** Structure-reactivity relationships, quantum organic chemistry, molecular properties and their interpretation, kinetics and catalysis. *Prerequisite:* 132 and 142 or 247. Three hours. Mr. Strauss or Mr. Kice. Alternate years, 1972-73.

233 **PHYSICAL ORGANIC CHEMISTRY—MECHANISMS** Methods and results of investigations of mechanisms of common organic reactions. *Prerequisite:* 132 and 142 or 247. Three hours. Mr. Krapcho or Mr. Kice. Alternate years, 1971-72.

246 **FUNDAMENTALS OF SPECTROSCOPY** A general discussion of molecular spectroscopy, rotational and vibrational states of molecules, symmetry of vibrations; introduction to electronic spectra. *Prerequisite:* 141, 142, mathematics 124 or permission of the instructor. Three hours. Mr. Weltin. Alternate years, 1971-72.

247 **INTRODUCTION TO QUANTUM MECHANICS** General considerations of quantum mechanics. Development of techniques pertinent to the application of quantum mechanics to chemical problems. *Prerequisite:* 141, 142 or equivalent. Three hours, Mr. Weltin.

248 **CHEMICAL THERMODYNAMICS** Systematic study of the application of thermodynamics to chemical problems. Concepts of statistical thermodynamics to be introduced. *Prerequisite:* 141, 142 or equivalent. Three hours. Mr. Wulff.

249 **STATISTICAL MECHANICS** Development of statistical mechanics and its application to problems of chemical interest. *Prerequisite:* 141-142 or equivalent; 247 recommended. Three hours. Mr. Flanagan. Alternate years, 1972-73.

251, 252 **ADVANCED ORGANIC CHEMISTRY** Detailed discussion of fundamental principles and reactions in organic chemistry. Stereochemistry, conformational analysis, ring strain, reactivity criteria in the main reaction classes, reaction mechanisms, and important synthetic methods are discussed. *Prerequisite:* 131, 132, credit for or concurrent enrollment in 141, 142, 251 for 252. Three hours. Messrs. Kuehne, Krapcho, and Strauss.

Seminars are required of graduate students and seniors concentrating in chemistry.

184 **SENIOR SEMINAR** Oral and written presentation of a subject of current chemical interest. *Prerequisite:* audit of 381. One hour. Staff.

197, 198, 199 **UNDERGRADUATE RESEARCH** Special study in inorganic, physical, or organic chemistry and with an assigned staff member. Findings submitted in written form. *Prerequisite:* 1, 2 or 11, 12 and departmental permission. Credit as arranged with a maximum of four hours per semester and twelve hours for the undergraduate program. 197 is offered in the fall, 198 in the spring, and 199 in the summer.

Classics

COLLEGE OF ARTS AND SCIENCES

Professors Gilleland (Chairman), Bliss, and Davison; Associate Professors Ambrose and Schlunk.

Greek

(There are no prerequisites to any Greek course. Students who have previously studied Greek should consult the department.)

1-2 **ELEMENTARY GREEK** Four hours. Staff.

11, 12 **INTERMEDIATE GREEK** Review of syntax. Readings. Three hours. Staff.

GREEK 32¹ MYTHOLOGY Greek myth in literature, art, and music from antiquity to modern times. No prerequisites. 3 hours. Mr. Ambrose.

111, 112 **PROSE COMPOSITION** Required of students who concentrate in Greek. One hour. Mr. Gilleland.

151 **GREEK DRAMA IN TRANSLATION** Three hours. Staff. On demand.

153 **GREEK HISTORIANS IN TRANSLATION** Three hours. Staff. On demand.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

201 **GREEK ORATORS** Three hours. Mr. Gilleland. Alternate years, 1971-72.

202 **GREEK COMEDY** Three hours. Mr. Ambrose. Alternate years, 1972-73.

203 **GREEK HISTORIANS** Three hours. Mr. Bliss. Alternate years, 1972-73.

204 **GREEK TRAGEDY** Three hours. Mr. Ambrose. Alternate years, 1971-72.

205 **GREEK PHILOSOPHERS** Three hours. Mr. Schlunk. Alternate years, 1972-73.

206 **GREEK EPIC** Three hours. Miss Davison. Alternate years, 1971-72.

Latin

(There are no prerequisites to any Latin course. Students who have had two years of high school Latin normally enroll in Latin 5 or Latin 12. Those who have had more normally enroll in Latin 101.)

1, 2 **ELEMENTARY LATIN** For students who present less than two years of high school Latin.² Four hours. Staff.

5 **ADVANCED ELEMENTARY LATIN** Extensive review of Latin syntax. Selections from prose writers. Three hours. Staff.

1. This course may be used towards the distribution requirement of the College of Arts and Sciences in either category A or B.
2. Students who have completed two years of high school Latin more than two years prior to their entrance into the University must obtain departmental permission to enroll in Latin 1, 2 for credit.

- 12 INTERMEDIATE LATIN Selections from Vergil and Ovid. Three hours. Staff.
- 32 ETYMOLOGY Derivation of English words from Greek and Latin bases. Training in analysis of unfamiliar words; special attention to scientific vocabulary. No previous knowledge of Greek or Latin required. Three hours. Staff.
- 101, 102 SURVEY OF LATIN LITERATURE Selections from the principal Roman authors. Three hours. Staff.
- 111, 112 LATIN PROSE COMPOSITION Required of students who major in Latin and of those who wish to be recommended to teach Latin. One hour. Mr. Bliss.
- 152 ROMAN EPIC IN TRANSLATION Three hours. Staff. On demand.
- 154 ROMAN SATIRE IN TRANSLATION Three hours. Staff. On demand.
- 193, 194 COLLEGE HONORS
- 195, 196 SPECIAL TOPICS
- 197, 198 READINGS AND RESEARCH
- 203 REPUBLICAN PROSE Three hours. Mr. Gilleland.
- 204 EPIC POETS Three hours. Mr. Ambrose.
- 227 ROMAN LYRIC POETS Three hours. Mr. Schlunk. Alternate years, 1972-73.
- 251 ROMAN LETTERS Three hours. Mr. Bliss. Alternate years, 1971-72.
- 252 COMEDY Three hours. Mr. Bliss. Alternate years, 1971-72.
- 253 ROMAN ORATORY Mr. Gilleland. Alternate years, 1971-72.
- 255 HISTORIANS OF THE EMPIRE Three hours. Miss Davison. Alternate years, 1972-73.
- 256 SATIRE Three hours. Mr. Gilleland. Alternate years, 1971-72.
- 271 SILVER LATIN Three hours. Mr. Bliss. Alternate years, 1972-73.
- For The Teaching of Latin, see secondary education 179.
- For Roman Art, see art 52.

V Communication and Theatre

COLLEGE OF ARTS AND SCIENCES

Professors Huber, Lewis, London (Chairman), and Luse; Associate Professors Feidner, Lane, Manchel, and P. Smith; Assistant Professors Bryan, Howell, Schenk, Shields, Wilson, and Yadav; Instructors, Cronin, Dilley, Lardy, Losee, Neal, Petry, Schmider, Waite, and Worden; Lecturers Houghton, and N. Smith; Coordinator Daruvala.

Communication and Public Address

- I FOUNDATIONS OF ORAL COMMUNICATION Three hours. I, II. Mr. Lewis and Staff.

3 PARLIAMENTARY PROCEDURE *Prerequisite:* sophomore standing. One hour. Mr. Huber.

11 PUBLIC SPEAKING Three hours. I, II. Staff.

14 GROUP DISCUSSION Theory and performance in small group communication, including preparation, language, leadership, analysis, reasoning, organization and interpersonal relations. Three hours. I, II. Staff.

31 ORAL INTERPRETATION OF LITERATURE A study of communicating orally to an audience, from the printed page, the meaning and beauty of a literary work. Three hours. I, II. Mr. London and Staff.

81 VOICE AND ARTICULATION Elements of speech and phonetics for the improvement of voice and articulation in communication. *Prerequisite:* sophomore standing. Three hours. I, II. Miss Luse.

101 PHONETICS Acoustic and physiologic phonetics. Analysis of English speech sounds used in the International Phonetic Alphabet. *Prerequisite:* sophomore standing. Three hours. Miss Luse and Mr. Shields.

111 ADVANCED PUBLIC SPEAKING: EMOTIVE MEANS OF PERSUASION Human motivation, attitudes, emotion, stereotypes, attention, and audience psychology as applied in the speaking situation. *Prerequisite:* 11. Three hours. Mr. Huber and Staff.

112 ADVANCED PUBLIC SPEAKING: LOGICAL MEANS OF PERSUASION Inductive, deductive, causal, and analogical reasoning as applied in the speaking situation. *Prerequisite:* 11. Three hours. Mr. Huber and Staff.

113 ADVANCED PUBLIC SPEAKING: STYLISTIC ELEMENTS Study of speech style and rhetorical criticism by analysis of great speeches and by writing longer speeches. *Prerequisite:* six hours, including 11. Three hours. Mr. Huber.

121 GENERAL SEMANTICS An analysis of the relationship between language and human behavior. *Prerequisite:* 1. Three hours. Mr. Lewis.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

201 THEORIES OF HUMAN COMMUNICATION A behavioral approach to the role of language, meaning, perception, thinking and social context in human communication process. *Prerequisite:* Nine hours of related courses, including 1. Three hours. Mr. Yadav.

210 CLASSICAL ORIGINS OF COMMUNICATION THEORY *Prerequisite:* Nine hours of related courses. Three hours. Mr. Waite.

212 PERSUASIVE COMMUNICATION Selected contemporary approaches to persuasion and the study of recent research contributions. *Prerequisite:* Nine hours, including 111. Three hours. Mr. Smith.

213 THEORIES OF SPEECH ANALYSIS Principles of speech criticism applied to speakers, speeches, and speech movements. *Prerequisite:* Nine hours of related courses. Three hours. Mr. Waite.

214 ISSUES IN AMERICAN PUBLIC ADDRESS *Prerequisite:* 213. Three hours. Mr. Waite and Mrs. Smith.

215 GROUP COMMUNICATION *Prerequisite:* Nine hours of related courses,

including 14. Three hours. May be repeated up to nine credit hours. Mr. Cronin and Mrs. Smith.

223 INTERPERSONAL COMMUNICATION *Prerequisite:* Nine hours of related courses, including 121. Three hours. Mr. Lewis.

225 CROSS-CULTURAL COMMUNICATION A study of cultural factors and cognitive process in cross-cultural communication. *Prerequisite:* Nine hours of related courses. Three hours. Mr. Yadav.

283, 284 SEMINAR *Prerequisite:* Departmental permission. Three hours. Staff.

294 SEMINAR FOR PROSPECTIVE TEACHERS OF COMMUNICATION *Prerequisite:* Twelve hours. Three hours. Mr. London.

Mass Communication

63 SURVEY OF MASS COMMUNICATION The historical development, socio-economic and political impacts of the press, radio, television and film in American society. Three hours. I, II. Mr. Howell and Mr. Yadav.

161 AUDIO PRODUCTION A practicum in the use of audio recording techniques and technology as employed in broadcasting, film and multi-media presentations. *Prerequisite:* 63. Three hours. Mr. Howell.

162 WRITING FOR MASS COMMUNICATION *Prerequisite:* 63. Three hours. Mr. Worden.

164 BASIC TELEVISION PRODUCTION *Prerequisite:* 161. Three hours. Mr. Dilley.

165, 166 DEVELOPMENT OF THE MOTION PICTURE *Prerequisite:* junior standing, 165 for 166. Three hours. Mr. Manchel.

263 ISSUES IN CONTEMPORARY MASS COMMUNICATION *Prerequisite:* Nine hours of related courses, including 63. Three hours. Staff.

264 ADVANCED TELEVISION PRODUCTION Emphasis on the following types of programs: educational, news, documentary, dramatic and variety. Laboratory use of the ETV studio. *Prerequisite:* 164. Three hours. Mr. Dilley.

265 CINEMATOGRAPHY Advanced study of film expression and production of student films. *Prerequisite:* 167 or permission of the instructor. Three hours. Mr. Worden.

266 SEMINAR IN FILM *Prerequisite:* Six hours of related courses, including 165 or 166. Three hours. Mr. Manchel.

Speech Pathology-Audiology

74 INTRODUCTION TO DISORDERS OF ORAL COMMUNICATION *Prerequisite:* sophomore standing. Three hours. Mrs. Wilson and Staff.

270 LEARNING AND DEVELOPMENT OF SPEECH AND LANGUAGE Speech and language acquisition in relation to current learning theory and methods of linguistic analysis. *Prerequisite:* nine hours of speech and psychology, including 74. Three hours. Mrs. Wilson.

271 SPEECH PATHOLOGY I Etiology, symptomatology, and principles of habilitation for voice disorders (including the laryngectomized) and cleft palate. Observation required. *Prerequisite:* Twelve hours of speech and psychology, including 281. Three hours. Miss Luse.

272 **SPEECH PATHOLOGY II** The nature of articulation and the etiology, diagnosis, and treatment of disorders of articulation. *Prerequisite:* Twelve hours of speech and psychology, including 74, 101. Three hours. Staff.

273 **PRINCIPLES OF AUDIOLOGY** An introduction to clinical audiology including a consideration of hearing disorders, tests of the hearing function, and hearing conservation programs. *Prerequisite:* Twelve hours of speech and psychology, including 74. Three hours. Mrs. Houghton.

275, 276 **CLINICAL STUDY** Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. *Prerequisite:* Twelve hours in speech and hearing science courses, including 271 or 272; departmental permission. Credit as arranged. Staff.

281 **ANATOMY-PHYSIOLOGY OF SPEECH** *Prerequisite:* nine hours of speech and psychology. Four hours. Miss Luse.

282 **ANATOMY-PHYSIOLOGY OF AUDITION** *Prerequisite:* nine hours of speech and psychology. Four hours. Mrs. Wilson.

Theatre

39 **INTRODUCTION TO THEATRE** Three hours. I, II. Messrs. Bryan and Feidner.

41 **ACTING** *Prerequisite:* 39; sophomore standing. Three hours. I, II. Messrs. Feidner and Lane.

141 **ADVANCED ACTING** Periods and styles of acting, intensive character analysis, frequent acting projects, including at least one public performance. *Prerequisite:* 41 and departmental permission. Three hours. Messrs. Feidner and Lane.

142 **PLAY DIRECTING** *Prerequisite:* six hours, including 39. Three hours. Mr. Feidner.

145, 146 **DEVELOPMENT OF WESTERN THEATRE** *Prerequisite:* junior standing. Three hours. Mr. Bryan.

151 **STAGECRAFT** Scenic elements of play production; analysis of theatre forms, study and application of basic elements of scenery construction. *Prerequisite:* 39. Three hours. Mr. Schenk.

154 **BASIC SCENE DESIGN** Fundamental principles of scenic design, history and practice. *Prerequisite:* 39. Three hours. Mr. Schenk.

252 **LIGHTING** Theory and practice in the illumination of stage productions and the creation of aesthetic effects. *Prerequisite:* 151. Three hours. Mr. Schenk.

254 **ADVANCED SCENE DESIGN** Analysis of the drama from the standpoint of its visual creation upon the stage; audience-stage relationships, styles of production. *Prerequisite:* 154. Three hours. Mr. Schenk.

Dental Hygiene

DIVISION OF HEALTH SCIENCES

Associate Professor Sawabini (Chairman); Associate Professors Faigel, Farnham, P. L. Heininger, Lampert, Marceau; Assistant Professors Halebian, Long, Montgomery; Instructors Brown, Ingalls, MacLellan, Sloanaker.

1-2 DYNAMICS OF HEALTH CARE See Technical Nursing, page 222.

1 DENTAL HYGIENE (2) Study of the theories, of the practice of dental hygiene with emphasis on patient education and preventive procedures. Two hours. Mrs. Sloanaker.

2 DENTAL HYGIENE (0-6) Continuation of Dental Hygiene 1 including special patient care and clinical practice of dental hygiene procedures. Three hours. Mrs. Sloanaker.

11 ORAL TISSUES (2-4) The study of the morphology and physiology of oral tissues both microscopically and macroscopically. The identification of individual tooth forms. Three hours. Dr. Heininger, Miss Ingalls.

12 ORAL TISSUES The study of the related functions of the oral tissues, head and neck anatomy, occlusion, mastication, comminution and deglutition. Two hours. *Prerequisite:* 11. Dr. Heininger, Miss Ingalls.

51-52 PHARMACOLOGY AND ANESTHESIOLOGY (1-0) (1-0) The reactions and uses of drugs. Anesthesia, general and local, as used in dental practice. One hour. Dr. MacLellan.

53-54 ORAL PATHOLOGY (2-2) General pathology of the more common diseases affecting the human body. Pathology of the teeth and their supporting structures. Two hours. Dr. Farnham.

55 PERIODONTICS (1-0) Classification of periodontal disease, clinical picture, etiological factors, and types of treatment. Particular emphasis is placed on the role of the hygienist in patient education for the prevention of periodontal disease. One hour. Dr. Faigel.

61 RADIOLOGY (1-1) Study, demonstration, and practice of the fundamentals of intra-oral radiographic technic including electrophysics; angulation of machine; placing of films and complete processing of films. One hour. Miss Brown.

62 DENTAL PRACTICE (1-0) Principles of professional ethics and economics; office management and essentials of practice building. One hour. Dr. Montgomery.

72 DENTAL HEALTH EDUCATION (2-0) Demonstration and practical application of modern methods of dental health education. Teaching methods; visual aids; surveys and statistics; materials; campaigns; school dental programs. Two hours. Staff.

74 PUBLIC HEALTH (2-0) Public health as it applies to community sanitation; communicable disease control; organization, powers and function of health departments and voluntary health agencies; relation of dentistry to public health. Two hours. Dr. Long.

81-82 CLINICAL DENTAL HYGIENE (0-15) Clinical practice on patients from

simple to more difficult cases with children and adults. Field practice at local dental clinics, hospitals and in Children's Homes. Five hours. Staff.

91-92 DENTAL MATERIALS (1-0) Study of materials used in dental practice. One hour. Dr. Lampert.

Economics and Business Administration

COLLEGE OF ARTS AND SCIENCES

Professors Dellin, Greif, Nadworny (Chairman), and Nyquist; Associate Professors Alnasrawi, Campagna, Chase, Gross, Michael, Severance, and Squire; Assistant Professors Battelle, Kuklis, Laber, Salgo, Tashman, Tirney and Wicker; Instructor Erdmann and Gear.

DESIGNATED ECONOMICS COURSES: 3, 11, 12, 101, 103, 104, 105, 141, 142, 181, 183, 186, 188, 190, 193, 194, 195, 196, 197, 198, 216, 217, 234, 240, 241, 256, 258, 267, 285, 290, 291, 292, 295, 297, 298.

DESIGNATED BUSINESS ADMINISTRATION COURSES: 9, 10, 11, 12, 13, 14, 101, 121, 122, 123, 127, 130, 132, 141, 142, 143, 160, 161-162, 164, 181, 183, 188, 193, 194, 195, 196, 197, 198, 206, 207, 228, 229, 251, 252, 254, 256, 266, 271, 272, 273, 276, 277, 289, 297, 298.

3 CURRENT ECONOMIC PROBLEMS Designed primarily for non-majors to deal with some of the current issues and problems which face contemporary economies. Three hours. Staff.

9, 10 BUSINESS LAW First semester: concepts of law as related to business, including law of contracts, sales, bailments, and negotiable instruments. Second semester: business and laws of agency, partnerships, and corporations. *Prerequisite:* 12, or concurrent enrollment. Three hours. Messrs. Erdmann and Gear.

11, 12 PRINCIPLES OF ECONOMICS Three hours. Staff.

13, 14 PRINCIPLES OF ACCOUNTING (2-4) *Prerequisite:* 13 for 14. Four hours. Staff.

15, 16 ECONOMIC HISTORY OF THE UNITED STATES Three hours. Messrs. Nadworny and Squire.

11 and 12 are prerequisites for all courses number 100 and above with the exception of accounting courses.

101 MONEY AND BANKING Commercial and central banking with special attention given to the Federal Reserve System, monetary theory and policy. *Prerequisite:* 12. Three hours. Messrs. Alnasrawi and Severance.

103 ECONOMICS OF TAXATION Revenues and expenditures of federal, state, and local governments and their effects upon individuals, business institutions, and the national economy. *Prerequisite:* 12. Three hours. Staff.

104 ECONOMICS OF STATE AND LOCAL TAXATION Revenues, expenditures, and

debt management problems of state and local governments; analysis of state and local fiscal relationships. *Prerequisite:* 12. Three hours. Staff.

105 INTERNATIONAL TRADE AND FINANCE Theories of international values, adjustment of international balances, foreign exchange, international aspects of money and banking, and tariffs. *Prerequisite:* 11, 12. Three hours. Mr. Alnasrawi.

121 PRINCIPLES OF MARKETING The place of marketing in our economy. Analysis of the marketing structure by functions, institutions, and commodities. *Prerequisite:* 12. Three hours. Mr. Greif.

122 PROBLEMS IN MARKETING Application of the case method to discover solutions to problems which challenge producers and middlemen in marketing goods and services. *Prerequisite:* 121. Three hours. Mr. Greif.

123 PERSONAL SELLING IN THE ECONOMY The personal selling function as a communication activity. Behavioral science areas are explored for insight into the selling process. Individual projects. *Prerequisite:* 122. Three hours. Mr. Greif.

127 RESEARCH METHODS IN MARKETING Introduction to the problems of methodology and design in marketing research. Basic design of proof, selection of economic designs, scaling techniques. Bayesian applications, factor analysis, and forecasting methods. *Prerequisite:* 122. Three hours. Mr. Kuklis.

130 SALES MANAGEMENT AND PROMOTION Methods of selection, testing, training, compensation, and control. Principles and practices of creative selling. Sales organization analysis and the coordination of related department functions. *Prerequisite:* 121. Three hours. Messrs. Greif and Kuklis.

132 FUNDAMENTALS OF ADVERTISING Advertising as an economic and social influence. Principles and techniques of copy preparation, selection of media and agency activities. Practice in preparation of advertising copy and layout. *Prerequisite:* 121 or consent of instructor. Three hours. Mr. Greif.

141 LABOR ECONOMICS Labor as an economic factor: the labor force, wages, productivity, and income. Wage and hour legislation, labor security, and unemployment insurance. *Prerequisite:* 12. Three hours. Messrs. Nadworny and Chase.

142 COLLECTIVE BARGAINING Issues and practices in union-management relationships. Collective bargaining impacts on the economy. The grievance process, arbitration, and labor relations laws. *Prerequisite:* 141. Three hours. Messrs. Nadworny and Chase.

143 INDUSTRIAL MANAGEMENT Principles and practices employed in the direction and operation of industrial organizations. Techniques of organization and control of operations. Personnel function in an industrial structure. *Prerequisite:* 12. Three hours. Mr. Squire.

160 INTRODUCTION TO INTEGRATED DATA PROCESSING AND COMPUTERS A general introduction to business data processing and the components and characteristics of electronic digital computers. Programming systems, systems analysis, system design, elementary flow charting, and processing procedures. *Prerequisite:* 14. Three hours. Mr. Tirney.

161-162 INTERMEDIATE ACCOUNTING An intensive examination of accounting theory, valuation methods, and classification procedures related to balance sheet accounts. Second semester: consideration of balance sheet accounts continued; together with methods and techniques of financial analysis. *Prerequisite:* 14. Three hours. Mr. Nyquist.

164 BASIC FEDERAL TAXES *Prerequisite:* 14. Mr. Michael.

181 TRANSPORTATION AND PUBLIC UTILITIES Social and economic aspects of transportation problems as revealed by analysis of the nature, history, and problems of transportation public utilities agencies of the United States. *Prerequisite:* 12. Three hours. Mr. Squire.

183 GOVERNMENT AND BUSINESS Economic causes and consequences of government activities and their impact upon the private sector of the economy. *Prerequisite:* 12. Three hours. Mr. Squire.

186 MICROECONOMIC THEORY Analysis of consumer demand, supply, market price under competitive conditions and monopolistic influences, and the theory of income distribution. *Prerequisite:* 12. Three hours. Staff.

188 ELEMENTARY STATISTICS (2-2) Descriptive statistics: frequency distributions, measures of central location, measures of variation; Introduction to Probability; Theoretical Distribution: normal, binomial, and student's *t*; Tests and Hypotheses; Elements of Index Numbers; Introduction to correlation and regression. *Prerequisites:* Economics 11 and 12. Three hours. Staff.

190 MACROECONOMIC THEORY Keynesian and post-Keynesian theories of economic development; government policies in relation to the problems of employment, stability and growth in developed economies. *Prerequisite:* 11, 12. Three hours. Mr. Campagna.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

206 PRINCIPLES OF INVESTMENTS An analysis of the investment process, including an examination of types of financial assets, the markets in which such assets are traded, and factors affecting their values. *Prerequisite:* 12 and 14. Three hours. Mr. Battelle.

207 CORPORATE FINANCE A study of the sources of financing and the efficient utilization of funds by corporations. Topics include capital budgeting, capital structure, dividend policy, and problems of financing new business ventures, large and small. *Prerequisite:* 12 and 14. Three hours. Mr. Battelle.

216 ECONOMIC DEVELOPMENT Theories of economic growth applied to underdeveloped areas of the contemporary world, including the political and social determinants of economic progress. *Prerequisite:* 11, 12. 190 recommended. Three hours. Mr. Alnasrawi.

217 REGIONAL ECONOMIC GROWTH Theoretical models of regional growth; relationships among growth theory, international trade theory, and location theory. Interregional factor movements related to historical patterns of income growth at the state level in the U.S. *Prerequisites:* 186, 190. Three hours. Mr. Laber.

228 CURRENT MARKETING DEVELOPMENTS Modern marketing theory and practice. Topics include: the nature of consumer changes; urban and suburban trading centers; the distribution cycle; marketing legislation; functional and institutional changes. *Prerequisite:* 122. Three hours. Mr. Greif.

229 MARKETING MANAGEMENT Formulation of overall policies and planning strategies for marketing programs. Product planning and development; channel selection; market and sales forecasts; advertising and sales campaigns. *Prerequisite:* 122. Three hours. Mr. Greif.

234 **MONETARY THEORY** Analysis of Classical, Keynesian, and modern macroeconomic models; micro and macro demand for and supply of money; portfolio choice; term structure of interest rates and the influence of financial intermediaries. *Prerequisite:* 190. Three hours. Staff.

238 **ECONOMIC HISTORY OF MODERN EUROPE** A comparative historical study of the process of economic growth as experienced in Britain, France, Germany, and Russia since 1760. For the economic history of pre-industrial Europe see history 237. *Prerequisite:* 12 and history 12. Three hours. Staff.

240 **WAGE AND EMPLOYMENT THEORY** Microeconomic analysis of the pricing of labor. Theoretical economic and behavioral models of the role and effects of institutions on the wages, allocations, and levels of utilization of labor resources. *Prerequisites:* 186, 190; 141 highly desirable. Three hours. Mr. Chase.

241 **MANPOWER IN AN ADVANCED ECONOMY** Fundamental changes in the structure of the American labor force; income, education, occupational distribution, and unemployment factors. Implications and impacts of governmental and private sector programs on manpower training and allocation. Income maintenance and manpower. *Prerequisite:* 141. Three hours. Messrs. Chase and Nadworny.

251 **PERSONNEL ADMINISTRATION** The personnel function in organizations; selecting and training employees; job analysis and evaluations; evaluating employees; wages and wage administration; problems of morale; human relations in the supervision of personnel. *Prerequisite:* 141. Three hours. Mr. Nadworny.

252 **EXECUTIVE DECISION-MAKING** Synthesis of the management and operation of a firm in terms of production, marketing, personnel, and finance. The process of decision-making, planning and execution of policies. *Prerequisite:* 121, 143, and 207. Three hours. Messrs. Nadworny and Squire.

254 **SCIENTIFIC MANAGEMENT AND LABOR** Development of scientific management; reactions and relationship of organized labor to it. Long-range effects of scientific management on the structure and policies of industry and organized labor. *Prerequisite:* 143. Three hours. Mr. Nadworny.

256 **AMERICAN BUSINESS AND ECONOMIC HISTORY** Evolution of firms and industries in U.S. economy. The roles of federal and state governments and of legislation. Development of American management. *Prerequisite:* 143. Three hours. Mr. Nadworny.

258 **PROBLEMS OF COMMUNISM** (same as political science 258) A comparative study of economic and political problems of applied communism with particular emphasis on current developments in selected Communist countries. *Prerequisite:* Twelve hours in history and/or social sciences. Three hours. Mr. Dellin.

266 **ADVANCED ACCOUNTING** Accounting for partnerships, ventures, consignments, installment sales, insurance, statement of affairs, receivers, realization and liquidation, estates, trusts, home offices and branches, and parent and subsidiary accounting. *Prerequisite:* 162. Three hours. Mr. Nyquist.

267 **INTRODUCTION TO ECONOMETRICS** Classical least-squares regression model; tests of significance; problems of the linear model—collinearity, identification, auto-correlation; FORTRAN programming and computer usage in econometric research. *Prerequisite:* 186, 188, and 190. Three hours. Messrs. Laber and Tashman.

271 AUDITING *Prerequisite:* 266. Three hours. Mr. Michael.

272, 273 COST ACCOUNTING Second semester, special topics with an emphasis on budgeting, cost control and capital budgeting. *Prerequisite:* 14, 272 for 273. Three hours. Mr. Nyquist.

276 C.P.A. PROBLEMS Review of questions and problems from past C.P.A. examinations, coupled with a study of the opinions of the Accounting Principles Board. *Prerequisite:* 266. Three hours. Mr. Nyquist.

277 INTRODUCTION TO OPERATIONS RESEARCH Application of quantitative techniques to the formulation and solution of economic and business problems. Topics include demand and cost analysis, forecasting methods, linear programming, inventory and queuing theory. *Prerequisite:* 188. Three hours. Staff.

285 COMPARATIVE ECONOMIC SYSTEMS *Prerequisite:* 11, 12 and six hours in another social science. Three hours. Mr. Dellin.

289 QUANTITATIVE METHODS IN BUSINESS (2-2) *Prerequisite:* 188. Three hours. Staff.

290 THE SOVIET ECONOMY Seminar. *Prerequisite:* 12 and six hours in another social science. Three hours. Mr. Dellin.

291 ECONOMIC PATTERNS AND POLICIES OF EASTERN EUROPE An area approach to the resources, organization, and domestic and foreign economic policies of the Communist countries of Eastern Europe, with special emphasis on recent changes. *Prerequisite:* 12 and six hours in another social science. Three hours. Mr. Dellin.

292 INTERNATIONAL ECONOMIC PROBLEMS AND POLICIES Important aspects of international cooperation and conflict in the economic sphere; quest for foreign markets, raw materials, investment opportunities, and population outlets. *Prerequisite:* 12. Three hours. Mr. Alnasrawi.

293 WEST EUROPEAN ECONOMIES A study of the evolution of the economic systems of West European countries, with particular emphasis on the Common Market and its foreign Economic relations. *Prerequisite:* 12 and six hours in another social science. Mr. Dellin.

295 DEVELOPMENT OF ECONOMIC THOUGHT Development of economic ideas. The Pre-Classical, Classical, Socialist, Neo-Classical, Keynesian Schools and individual theoreticians. *Prerequisite:* 186 and 190 or concurrent enrollment. Three hours. Mr. Dellin.

297, 298 SEMINAR For students concentrating in the department. Review of recent books and periodic literature; discussions of topics of contemporary interest; student reports based upon personal investigation. *Prerequisite:* senior standing; departmental permission. Three hours. Staff.

V Education

COLLEGE OF EDUCATION

Professors Boller, Corrigan, Fishell, Hunt, Rippa; Associate Professors Carlson, Case, Evans, Fox, Gobin, Leggett, McKenzie, Nichols, Peterson, Petrusich, Stocker, Wheeler; Assistant Professors Abruscato, Agne, Avery, Bright, Bryant, Burrell, Chase, Christensen, Clements, Conrad, Dunkley, Erb, Greig, Hanley, Lang, Lange, Larson, Marchant, McEntee, McJulien, Meyers, Moore, Nash, Ponzio, Rathbone, Saurman, Shiman, Soderberg, Strassburg; Instructors Bloomenthal, Burdett, Carroll, Christie, Egner, Faliwene, Greenberg, Guerette, Knight, Kusiak, LaCasse, Lates, Nedde, Paolucci, Perelman, Royce, Schneider, Slack, Smith, Szabo, Watson; Physical Education Specialists Condon, Farrell, Hayes, Reinhardt. Affiliated Faculty: Professors Hand, Lidral, Meserve, Pappoutsakis; Associate Professors Fuller, Lorenz, Manchel, Schultz; Assistant Professors Biddle, Lepeschkin, Read, Weinrich, Wigness; Instructors Geno, Sherman, Walker.

For students who are not in teacher education, courses in education are open only by permission of the office of the Dean of the College of Education. In pre-service programs, 200-level courses in education are recommended only for graduate students.

2 FOUNDATIONS OF EDUCATION Social foundations of education; development of American education; education as a profession. Three hours. I or II. Staff.

7 EDUCATIONAL PSYCHOLOGY Principles of educational psychology as drawn from research, theory, and educational practice. A study of the learning process, its determining conditions, and its results. *Prerequisite:* junior standing; not open to students who take education 145-146. Three hours. Staff.

142 AUDIO-VISUAL MATERIALS AND METHODS Designed to increase teacher capabilities in the use of instructional media and in the integration of media into the classroom and curriculum. Emphasis will be given to technology as it relates to individualizing instruction and to meeting the needs of learners in various kinds of groups. Activities will be directed to preparation of materials and the collation of sources of media used in elementary education. Laboratory time will be provided in the course structure. Three hours. Mr. McJulien.

145-146 LEARNING AND HUMAN DEVELOPMENT The developing individual; psychology of learning with particular application to human development; measurement and evaluation of learning and development; opportunities for related field experiences. *Prerequisite:* junior standing. Three hours. Staff.

190 HISTORY OF EDUCATIONAL THOUGHT Educational ideas from the seventeenth century to the present with emphasis upon the historical development of the American school. *Prerequisite:* senior standing. Three hours. Miss Boller, Mr. Conrad, Mr. Nash, Mr. Rippa, Mr. Shiman.

197 READINGS AND RESEARCH Individual research problem or directed reading in an area of special interest to the student. *Prerequisite:* permission of the instructor. Variable credit, one to four hours per semester. Course may be repeated for a maximum of eight hours credit. Staff.

198 PERSONAL COMPONENT The personal component offers students an

opportunity to pursue an activity under self-direction. Each student is required to state the objectives for his study and make a contractual arrangement with his personal component adviser to fulfill the terms of the contract. Each contract holds one credit. Multiple contracts and renewable contracts are possible. Options such as education colloquia, community action experience, seminars and discussion groups, individual counseling, group counseling, and others will be provided during the four years. The course may be repeated for a maximum of seven hours credit. Mr. Shiman and Staff.

202 PHILOSOPHY OF EDUCATION Educational theory and philosophy past and present; contributions of leading educational philosophers; the interrelationships of education, society, and philosophy. *Prerequisite:* twelve semester hours in education and related areas. Three hours. Miss Boller, Mr. Nash, Mr. Rippa.

204 SEMINAR IN EDUCATIONAL HISTORY: THE STRUGGLE FOR EQUALITY OF OPPORTUNITY A study of selected topics in the history of education from the "Golden Age" of Greece to the present. Stresses the relationships of education to current social and political trends. Special attention to the nature of education in democratic and authoritarian social orders. Discussions and research will revolve around such topics as the education of women, the plight of American Indians, and the quest of the black people throughout the world for equality and freedom. *Prerequisites:* 12 hours in education and related areas, or a major in history. Three hours. Mr. Rippa.

205 HISTORY OF AMERICAN EDUCATION History of principles and practices in American education as they relate to social, economic, political, and cultural developments. *Prerequisite:* twelve hours in education and related areas, or a major in history. Three hours. Mr. Rippa.

206 COMPARATIVE EDUCATION An examination of educational policies and practices in selected countries throughout the world. Special attention will be paid to those topics that relate to important issues in American education. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Shiman.

211 EDUCATIONAL MEASUREMENTS Essential principles of measurement in education; test construction, application, and analysis. *Prerequisite:* twelve semester hours in education and related areas. Three hours. Staff.

212 CHILD AND ADOLESCENT DEVELOPMENT A study of the growth and development of the individual from infancy to adulthood with special emphasis upon implications for teaching and learning. *Prerequisite:* 12 hours in education and related areas. Three hours. Staff.

220 PERSONALITY DEVELOPMENT Study of personality and behavior theory as related to problems of individual adjustment and growth. The personality and problems of the teacher, problems of the pupil, and experiences in the family, school, and community are considered in planning ways of dealing with individual adjustment and in formulating programs of mental hygiene. *Prerequisite:* 12 hours in education, psychology, and/or related areas. Three hours. Mr. Peterson.

222 IMPROVEMENT OF READING INSTRUCTION IN THE ELEMENTARY SCHOOL A comparative analysis of current and emerging philosophies, progress and practices for teaching reading in the elementary school. Examination and evaluation of basal textbook, individual and specialized reading programs. *Prerequisite:* twelve hours in education and/or related areas including an introductory course in reading. Three hours. Mrs. Lang.

223 **READING PROGRAMS IN SECONDARY SCHOOLS AND COLLEGES** Relationship of reading to learning; study of organization, procedures, and materials for developing reading improvement programs for secondary schools and college students reading in content areas. *Prerequisite:* twelve hours in education and/or related areas, including an introductory course in reading or instructor's permission. Three hours. Mrs. Lang.

234 **LITERATURE AND LANGUAGE FOR CHILDREN AND YOUTH** A study of the characteristics, interests, and reading habits of children and young people; criteria for selection and evaluation of literature; methods of organizing units for more effective teaching of literature and using books in the content areas; techniques for using literature in the classroom and in the language arts program; an opportunity to read widely among selected books for children and youth will also be provided. *Prerequisite:* 12 hours in education and related areas or consent of the instructor. Three hours. Mrs. Lang.

242 **MODERN TRENDS IN ELEMENTARY EDUCATION** A study of modern educational principles and new and promising practices in today's elementary school. Emphasis on school program, materials, experiences in all areas of the school curriculum, both separately and as they relate in an integrated program. A survey of recent research including findings regarding school programs and activities. Opportunity for individual study of problems in elementary education. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Wheeler and Miss Petrusich.

248 **EDUCATIONAL MEDIA** Modern instructional aids, theory and practice; educational media related to psychology of teaching and learning. *Prerequisite:* twelve hours in education and related areas. Three hours. Mr. McJulien.

252 **SEMINAR IN AESTHETIC EDUCATION** A critical examination of aesthetic values transmitted in contemporary schools and a normative critique of aesthetic values which ought to be encouraged now and in the future. Consideration of ways to expand aesthetic awareness among children, youth and adults. The aesthetic quality of natural and man-created environments with implications for educational practice will be given special attention. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Conrad.

254 **ANTHROPOLOGY OF EDUCATION** An introductory examination of the theories and research of cultural anthropology and education. An anthropological perspective on education grounded in the cultural realities of life in the American school. Study of the interrelationship of culture and man—his educational values, beliefs, and practices. Topics for study include the meaning of culture, culture change, personality-in-culture, value orientations, comparative enculturative patterns, and cultural dynamics. *Prerequisite:* 12 hours in education and related areas. Three hours. Mr. Nash.

255 **THE SCHOOL AS A SOCIAL INSTITUTION** An analysis of major social forces that affect both elementary and secondary schools. The professional role of the modern educator and the values underlying educational policy will focus on such contemporary issues as political pressures in the public schools, the problems of integration, the place of religion in education, and the impact of the culturally deprived child on school and community. *Prerequisite:* 12 hours in education and related areas. Three hours. Miss Boller and Mr. Conrad.

275 **ANALYSIS OF READING AND RELATED LANGUAGE DIFFICULTIES** An interdisciplinary approach to the analysis and evaluation of learning difficulties

with an emphasis on reading and writing. Examination of the nature of difficulties; procedures and materials used for the assessment of reading performance. Practice with children is required. *Prerequisite*: twelve hours in education and related areas, including an introductory course in reading or permission of the Director of the Reading Center. Three hours. Mr. Hunt.

276 **LABORATORY EXPERIENCES IN READING AND RELATED LANGUAGE INSTRUCTION** A study of the various approaches and materials used for the prevention and correction of reading and written language difficulties. Supervised teaching of individuals and small groups experiencing severe difficulties in reading and related language skills. Apprenticeships in a variety of reading instructional programs. *Prerequisite*: The Analysis of Reading and Related Language Difficulties or consent of instructor. Three to six hours. Mr. Hunt.

292 **ISSUES IN CONTEMPORARY EDUCATION** Designed so that its content and structure may accommodate special issues in education not especially appropriate within the boundaries of an existing course. Credit according to the particular offering. *Prerequisite*: 12 hours in education and related areas. Two to six hours. Staff.

295-298 **LABORATORY EXPERIENCE IN EDUCATION** Supervised field experience in such areas as reading, administration, elementary and secondary education, and special education, designed to give students experience in specialized areas for their professional development. *Prerequisite*: permission of instructor. Credit as arranged. Staff.

Elementary Education

3, 4 **CHILD AND COMMUNITY** Supervised experiences with children's groups in the community. Students should plan a schedule which will enable them to have blocks of time, such as a morning or afternoon, free of regular classes. *Prerequisite*: sophomore standing. One hour. Miss Boller and Miss Greenberg.

111 **MUSIC METHODS FOR THE ELEMENTARY CLASSROOM TEACHER** A course to aid prospective elementary classroom teachers in understanding procedures and methods designed for the development of musical literacy and understanding in the elementary grades, and to develop practical applicability of these procedures and methods. *Prerequisite*: sophomore standing. Three hours. Mr. Wigness.

113 **SCHOOL MUSIC** Basic principles in elementary school music teaching. *Prerequisite*: Education 111 and Music 10 or Music 1, 2, and 5-6. Three hours. Staff.

121 **READING AND LANGUAGE ARTS** Principles underlying teaching reading; materials of instruction; reading readiness; vocabulary development; development of correct study skills; reading in the Language Arts program; observation in elementary school. Three hours. Mrs. Lang, Mrs. Stocker and Mr. Clements.

122 **DEVELOPMENTAL READING** Consideration of current practices and controversial issues relative to teaching reading. Study of recent innovations, methods, materials, as well as the organization and evaluation of various reading programs. *Prerequisite* for Elementary Education Majors, 181; all others consent of Director of Reading Center. Three hours. Staff.

134 **CHILDREN'S LITERATURE AND LANGUAGE ARTS** Traditional and modern children's literature in prose and poetry; appreciation and evaluation of literature

for children of all age levels; techniques of story telling; literature in the Language Arts program. Three hours. Mrs. Lang, Mrs. Stocker, Mr. Clements.

144 **TEACHING SCIENCE AND SOCIAL STUDIES** Curriculum, teaching methods, materials in the social studies and science in the elementary school. Observation and participation in elementary schools. Students should plan a schedule which will enable them to have blocks of time, such as a morning or afternoon, free of regular classes. Three hours. Mr. Agne and Miss Petrusich.

160 **TEACHING MATHEMATICS AND CRITICAL THINKING** Curriculum, teaching methods, materials in mathematics in the elementary school, development of critical thinking. Three hours. Mr. Agne, Miss Boller and Mr. Erb.

Secondary Education

15 **PARTICIPATION** A minimum of thirty clock hours of observation and participation in classroom work in junior and senior high schools. Weekly seminars on campus. Students should plan a schedule which will enable them to have blocks of time, such as a morning or afternoon, free of regular classes. *Prerequisite:* sophomore standing and acceptance by the Coordinator of Professional Laboratory Experiences. Two hours. Mr. Meyers and staff.

178 **SECONDARY METHODS AND PROCEDURES** This course is designed to prepare students for teaching in the secondary school. Experiences such as micro-teaching, role playing, classroom simulation, analysis of classroom behavior, and preparation of individualized materials are integral portions of the course. *Prerequisite:* satisfactory completion of Ed. 145 & 146, senior standing, and acceptance in a teacher education program. Three hours. Mr. Abruscato.

179 **SECONDARY METHODS AND PROCEDURES IN SPECIAL SUBJECT AREAS** (Latin, mathematics, romance languages, and social studies.) *Prerequisite:* prior or simultaneous enrollment in Ed. 178 and acceptance in a teacher education program. Variable credit, two or three hours, i.e. Latin 3 hrs., mathematics 2 hrs., romance language 3 hrs., and social studies 3 hrs. (English majors enroll in Ed.-Eng. 182 and Speech majors in Ed.-Speech 294. Speech minors are encouraged to enroll in 294.) Staff.

181 **STUDENT TEACHING** Teaching in the elementary or secondary schools under the guidance of cooperating teachers, principals, and college supervisors. For most undergraduates this is a full-time, eight-week, eight-credit experience during a semester. *Prerequisite:* senior standing, acceptance in a teacher education program, and acceptance by the Coordinator of Professional Laboratory Experiences. Variable credit, three to twelve hours. Mr. Meyers and staff.

182 **SEMINAR FOR PROSPECTIVE TEACHERS OF ENGLISH** (see English 182).

217 **SECONDARY SCHOOL CURRICULUM** Principles and problems in curriculum development. An analysis of recent curricular innovations in American secondary schools. *Prerequisite:* twelve hours of education and related areas. Three hours. Mr. Abruscato.

294 **SEMINAR FOR PROSPECTIVE TEACHERS OF SPEECH** (see Speech 294).

Art Education

140 **ENCOUNTER WITH ART I** Purpose and methods in contemporary Art Education. Workshops, discussions and lectures in creative art activities. Elementary grades K to 6. Three hours. Staff.

141 ENCOUNTER WITH ART II Purpose and methods in contemporary Art Education. Workshops, discussions and lectures in creative art activities. Secondary grades 7 to 12. *Prerequisite:* Art 140 or permission of Mrs. Walker or Miss Sherman. Three hours. Staff.

177 CURRICULUM AND PRACTICE IN ELEMENTARY AND SECONDARY ART EDUCATION The study and implementation of curriculum development in elementary and secondary Art Education. Students will plan and teach children's art classes at the Art Education Center. *Prerequisite:* 140 and 141 or permission of Mrs. Walker or Miss Sherman. Three hours. Staff.

183 SEMINAR: CURRENT ISSUES IN ART EDUCATION Research and discussion of issues relevant to contemporary art education. *Prerequisite:* 140 and 141 or permission of Mrs. Walker or Miss Sherman. Three hours. Staff.

184 SPECIAL PROBLEMS IN ART EDUCATION Individual investigation of a selected problem in Art Education under the supervision of staff. Reports and group discussions. *Prerequisite:* 177 and 178 (or concurrent enrollment in 178) or permission of Mrs. Walker or Miss Sherman. Three hours. Staff.

Music Education

For class performance study see 71, 72 under Music Department.

131 MUSIC METHODS Methods and materials in the teaching of vocal and instrumental music in elementary and secondary schools. *Prerequisite:* 145-146 and senior standing in music education. Five hours. Mr. Schultz.

Physical Education

PHYSICAL EDUCATION IN THE ELEMENTARY SCHOOL (see Physical Education 100).

HEALTH EDUCATION (see Physical Education 116).

PHYSICAL EDUCATION IN SECONDARY SCHOOLS (see Physical Education 155).

For information on the curriculum for prospective teachers of physical education and athletic coaches see page 105 and page 106.

HOME ECONOMICS AND EARLY CHILDHOOD EDUCATION (see Home Economics Education programs).

VOCATIONAL AND TECHNICAL EDUCATION (see Vocational, Technical and Extension Education programs).

Other Courses in Education

In addition to the courses previously described, the following courses are also offered, usually in the Summer Session and Evening Division.

<i>Number</i>	<i>Title</i>	<i>Credit Hours</i>
75	Driver Education Workshop, Basic	2
132	Teaching Arithmetic	3
150	Intensive Teacher Preparation	4
172	The Creative Process Through Art	3
175	Driver Education, Advanced	2
201	Administration of Athletic Programs	3
203	Principles of Physical Education	3

208	School Health Programs	3
209	Education of Teachers of the Mentally Retarded—I Early Years	3-6
210	Education of Teachers of the Mentally Retarded—II Later Years	3-6
214	The Slow Learner (Education of the Exceptional Child)	3-6
215	The Gifted Child	3
218	Workshop in Curriculum	4
219	Workshop in Economic Education	4
225	Teaching Social Studies in the Secondary School	3
227	Teaching Science in the Secondary School	3
228	Literature in the Junior-Senior High School Curriculum (Literary Criticism for Teachers)	3
229	Communicative Arts in Secondary Schools (Teaching English in Secondary Schools)	3
240	Musical Creativity in the Junior High School	3
241	Science for the Elementary School	3
243	Recent Trends in Music Education	3
244	Social Studies in the Elementary School	3
253	Practicum in Music Education	1-4
256	Methods and Materials in Elementary School Mathematics	3
257	Teaching Mathematics in the Secondary Schools	3
259	Teaching Foreign Language	3
260	Improvements in Teaching Bookkeeping and Basic Business Subjects	3
261	Seminar in Business Education	3
262	Principles, Problems, and Trends in Business Education	3
263	Improvement in Teaching Secretarial Subjects	3
264	Business Education Curriculum	3
270	Kindergarten Methods and Organization	3
271	Laboratory Experiences in Kindergarten Education	3
290	Basic Concepts in Music Education	3
291	Psychology of Music	3

(For detailed descriptions of 200 and 300 level courses see Graduate College Bulletin)

Engineering, Civil

COLLEGE OF TECHNOLOGY

Professor Oppenlander (Chairman); Associate Professors Dawson and Fay; Assistant Professors Condren, Downer, Eldred, Jewell and Olson; Engineer Dunham; Adjunct Professors Kiley and Knight; Adjunct Assistant Professor Stearns.

01 STATICS (3-0) Fundamentals of statics; composition and resolution of forces; the analysis of force systems in two and three dimensions; and centroids and moments of inertia. *Prerequisite:* mathematics 14. Three hours. Staff.

02 DYNAMICS (3-0) Fundamentals of kinematics covering rectilinear and curvilinear motion, relative motion. Coriolis acceleration, translation, rotation, and plane motion; fundamentals of kinetics covering translation, rotation, and plane motion of particles and rigid bodies; work, energy, power; impulse and momentum; and simple harmonic motion. *Prerequisite:* 01. Three hours. Staff.

10 SURVEYING (3-4) Fundamental surveying methods; propagation of errors as applied to surveying measurements; triangulation; control surveys; and traverse adjustments. *Prerequisite:* mathematics 13. Four hours. Staff.

11 GEOMETRONICS (2-4) Selected items in analytical photogrammetry; celestial observations, elements of photo-interpretation; theory of curves; and digital terrain analysis. *Prerequisite:* 10 or 12 and mathematics 14. Three hours. Staff.

12 PLANE SURVEYING (3-4) Fundamental surveying methods; elements of topographic surveying; and special problems according to student interest. For those not enrolled in civil engineering. *Prerequisite:* mathematics 2 and 9. Four hours. Staff.

100 MECHANICS OF MATERIALS I (3-0) The elastic and plastic behavior of materials; normal and shearing stresses from axial, torsional, and flexural loading combinations; deflections due to torsion and bending; applications to statically indeterminate members; analysis of plane stress and strain; failure theories; and design criteria. *Prerequisite:* 01. Three hours. Staff.

101 MECHANICS OF MATERIALS LABORATORY (0-3) Experimental stress analysis methods; fundamental properties of metals, plastics, and wood; and the effects of size, shape, method and speed of loading, and strain history on these properties. *Prerequisite:* 100. One hour. Staff.

120 ENGINEERING CONTRACTS (2-0) Contract law; engineering specifications; and ethics and professional conduct. *Prerequisite:* junior standing. Two hours. Staff.

140 TRANSPORTATION ENGINEERING (3-0) Analysis of transportation systems; planning studies for highways, airports, rail and mass transport, pipelines, and belt systems; traffic flow phenomena; geometric design; economic analysis during planning, design, and construction phases; and critical path scheduling techniques. *Prerequisite:* 10, mathematics 31 and junior standing. Three hours. Messrs. Dawson and Oppenlander.

150 SANITARY ENGINEERING I (3-0) The theory and design of water supplies, treatment processes, and distribution systems. *Prerequisite:* 160. Three hours. Mr. Condren.

151 SANITARY ENGINEERING II (2-3) The theory and design of waste water collection systems and primary, secondary and tertiary waste water treatment plants; and laboratory studies on waste water characteristics and treatment. *Prerequisite:* 150, chemistry 1-2. Three hours. Mr. Jewell.

160 HYDRAULICS (3-3) Mechanics of fluids with emphasis on incompressible fluids; flow meters; flow in closed conduits and open channels; elements of hydraulic machinery; laboratory studies of flow in closed conduits and open channels; and experiments with hydraulic machinery. *Prerequisite:* 02. Four hours. Mr. Downer.

161 FUNDAMENTALS OF FLUID MECHANICS (3-0) An introduction to the statics and dynamics of fluids. One-third to one-half of the semester will be spent on

acquiring the necessary level of competence in mathematics, statics, and dynamics. *Prerequisite:* one year of college calculus and one year of related science. Three hours. Staff.

162 **APPLIED FLUID MECHANICS (3-3)** The application of basic principles of fluid mechanics to practical problems; flow in closed conduits and open channels; and hydraulic structures and machinery. *Prerequisite:* 161. Four hours. Staff.

163 **PRINCIPLES OF HYDROLOGY (3-0)** A systematic analysis of the distribution and movement of water in the environment; detailed discussion in non-mathematical terms of the occurrence, distribution, and movement of water through the main phases of the hydrologic cycle; precipitation, interception, evaporation, soil moisture, groundwater, and runoff; and methods of measurement of a wide range of hydrologic parameters. *Prerequisite:* junior standing and one year of college science. Three hours. Mr. Downer.

170 **STRUCTURAL ANALYSIS I (3-3)** Analysis and design of statically determinate structures; consideration of function, expected loads, reactions, material choice, and layout of members; influence lines; criteria for positioning moving loads; design of steel and timber members under combined bending and axial loads; base plates; eccentric connections; and laboratory practice in graphic statics and design computations. *Prerequisite:* 100. Four hours. Mr. Eldred.

171 **STRUCTURAL ANALYSIS II (3-0)** Analysis of statically indeterminate structures by consistent deformation, least work, slope deflection, and moment distribution; determinations of deflections by virtual work, moment area, conjugate beam, and Williot-Mohr diagram; continuous structures; and an introduction to structural dynamics. *Prerequisite:* 170. Three hours. Mr. Eldred.

172 **ADVANCED STRUCTURAL DESIGN (3-3)** Advanced theory and design of structures with emphasis on continuous frames and trusses; consideration of wind stress analysis, space frames, moment connections, and camber diagrams; comparative studies of specifications for design in steel and aluminum; and laboratory problems in design of steel building frames and continuous girder and truss bridges. *Prerequisite:* 171. Four hours. Staff.

173 **REINFORCED CONCRETE (3-0)** Analysis of stresses in plain and reinforced concrete members; design of reinforced concrete structures; and theory of prestressed concrete. *Prerequisite:* 171 or concurrent enrollment. Three hours. Mr. Dunham.

180 **SOIL MECHANICS (3-3)** Identification, description, and physical properties of soils and other particulate systems; subsurface exploration; and engineering characteristics of natural deposits; consideration of stress distribution, permeability, consolidation, shear strength, and stability of soils; and laboratory practice in testing for index properties, permeability, consolidation, shear, and the effects of additives and cementing agents on particulate systems. *Prerequisite:* 100. Four hours. Mr. Olson.

181 **SUBSTRUCTURE ANALYSIS AND DESIGN (3-3)** Evaluation of subsoil conditions and earth pressures; and design of retaining walls, substructures for buildings and bridges, and cofferdams. *Prerequisite:* 173 and 180. Four hours. Mr. Olson.

190 **SPECIAL PROJECTS (3-0)** Independent investigation of a special topic under the guidance of a faculty member. The course work may consist of library investigations, unique design problems, and laboratory and field studies.

Preparation of a formal report on the problem is required. *Prerequisite:* senior standing and departmental permission. Three hours. Staff.

200 MECHANICS OF MATERIALS II (3-0) The study of stresses and strains at a point under plane and three-dimensional loading using Mohr's circle; failure theories and energy methods; and plastic design and buckling of plates and shells. *Prerequisite:* 172 or concurrent enrollment. Three hours. Staff.

210 AIRPHOTO INTERPRETATION (2-3) The development of techniques in aerial photographic interpretation; principles of stereoscopic viewing and identification of the airphoto features related to landform, vegetation, drainage, soil color tone, topography, and cultural features; special techniques in remote sensing; and the use of airphoto interpretation in soil identification, agricultural and forest surveys, water and air resource studies, regional and urban planning, and site and route locations. *Prerequisite:* senior or graduate standing. Three hours. Mr. Olson.

220 CONSTRUCTION ENGINEERING (3-0) Development of construction processes to obtain optimum facilities with minimum outlay of resources; relationship of techniques to design details and specification requirements; sequence studies by means of CPM and PERT techniques including crashing procedures; special problems in measurements of construction efficiency, cost estimating, and specification preparation; and case studies of local projects under construction. *Prerequisite:* senior or graduate standing. Three hours. Mr. Dunham.

225 ENGINEERING ECONOMY (3-0) Mathematical comparison of alternatives to maximize the financial return on engineering decisions and processes; project feasibility studies and design decision making; effect of taxes on engineering decisions; and analysis of risk and uncertainty. *Prerequisite:* senior or graduate standing. Three hours. Staff.

226 CIVIL ENGINEERING SYSTEMS ANALYSIS (3-0) Development of operations research techniques including linear and dynamic programming, inventory theory, replacement theory, queuing models, networks, and scheduling; procedures for solving complex problems; and application of systems analysis to problems in civil engineering. *Prerequisite:* senior or graduate standing. Three hours. Messrs. Dawson and Oppenlander.

230 URBAN PLANNING TECHNIQUES (3-0) Theories on the size, spacing, and functions of cities; economic, social, and physical determinants of various land-use elements; basic studies for urban planning; and the process of land-use planning including location and space requirements and the development of the land-use plan. *Prerequisite:* senior or graduate standing. Three hours. Messrs. Dawson and Oppenlander.

231 URBAN PLANNING ANALYSIS (3-0) The history and development of urban planning in the United States and other countries; special approaches to planning with attention to city design and appearance, quantitative methods in planning, and social welfare planning; plan implementation through programs, zoning, land subdivision regulations, and urban renewal; organization and administration of planning agencies; and financial planning. *Prerequisite:* senior or graduate standing. Three hours. Mr. Oppenlander.

240 TRAFFIC ENGINEERING CHARACTERISTICS (3-0) Analysis of the basic components of highway travel including driver, vehicle, roadway, environmental,

and pedestrian characteristics; evaluation of traffic demands imposed by road users for travel and parking; traffic flow and intersection characteristics; highway and intersection capacities; performance of traffic systems with particular attention to accidents and travel efficiency; and techniques for measuring traffic characteristics. *Prerequisite:* senior or graduate standing. Three hours. Messrs. Dawson and Oppenlander.

241 **TRANSPORTATION SYSTEMS ENGINEERING (3-0)** Introduction to the interdisciplinary aspects of transportation systems and their technological characteristics; mathematical analysis and synthesis of system problems including planning, design, and operation; economic consideration of transportation systems and economic analyses for decision making; transportation planning process; fiscal studies and financial planning; and administration of transportation systems. *Prerequisite:* senior or graduate standing. Three hours. Messrs. Dawson and Oppenlander.

250 **DESIGN OF WATER TREATMENT FACILITIES (1-6)** Design of treatment systems to provide water for domestic and industrial use; and source evaluation, demand projections, specific treatment processes, distribution systems, economics, and case studies. *Prerequisite:* 150. Three hours. Mr. Condren.

251 **DESIGN OF WASTEWATER TREATMENT FACILITIES (1-6)** Design of treatment systems for processing wastewaters from municipal and industrial sources to obtain desired receiving waterway protection; and population projections, site location, collection systems, lift stations, choice and sizing of unit processes, specification writing, cost estimates, and bid document preparation. *Prerequisite:* 151. Three hours. Mr. Jewell.

252 **INDUSTRIAL WASTE DISPOSAL (3-0)** A survey of the fundamental chemical, physical, and biological processes employed in the treatment and disposal of pollutants from the following industries: mining and metal processing, refinery and petrochemical, pulp and paper, food and meat processing, textiles, and electric generation. *Prerequisite:* 151. Three hours. Mr. Condren.

253 **AIR POLLUTION ABATEMENT (3-0)** Identification of specific air pollutants and their effects on humans, plants, and materials; concepts, principles, and application of air pollution control processes; and electrostatic precipitation, scrubbing, cyclonic separation, filtration, absorption, catalytic oxidation, and dispersion. *Prerequisite:* Chemistry 2 and Physics 18. Three hours. Mr. Condren.

254 **SOLID WASTES (3-0)** The significance of solid wastes generated from municipal, industrial, agricultural, and mining sources; the optimization and design of collection, disposal, and/or recycle systems; and sanitary landfills, incineration, composting, and material recovery. *Prerequisite:* Chemistry 2 and Physics 18. Three hours. Mr. Jewell.

255 **UNIT OPERATIONS OF WATER AND WASTEWATER TREATMENT (1-6)** An examination of major physical, chemical, and biological processes used in treating water and wastewater; theory and methods of obtaining data from bench through full scale units; analysis of data to obtain process optimization; and application of data to design. *Prerequisite:* 151. Three hours. Mr. Jewell.

260 **HYDROLOGY (3-0)** The basic theory of precipitation, run-off, infiltration, and ground water; precipitation and run-off data; and application of data for use in development of water resources. *Prerequisite:* 160 or Mechanical Engineering 142. Three hours. Mr. Downer.

261 OPEN CHANNEL FLOW (3-0) Application of the basic laws of fluid mechanics to flow in open channels; boundary layer theory; design of channels and transition structures; non-uniform flow; and non-uniform, spatially-varied flow problems. *Prerequisite:* 160, Mathematics 271. Three hours. Mr. Downer.

263 MEASUREMENTS IN APPLIED HYDROLOGY (2-3) Design of hydrologic experiments; observational methods, equipment and problems in describing precipitation, runoff, air temperature, relative humidity, wind movement, solar radiation, evaporation, soil temperature, infiltration, soil moisture, soil density, soil water pressure, sediment load, and snow density; data reduction and handling techniques; and application to the instrumentation and study of the hydrology of a small watershed. *Prerequisite:* 163 or 260. Three hours. Mr. Downer.

270 ADVANCED INDETERMINATE STRUCTURES (3-0) Matrix analysis of one, two, and three dimensional indeterminate structures using the finite-element approach; formulation and solution by the flexibility and direct stiffness matrix methods; emphasis on computer applications. *Prerequisites:* 171 and a basic knowledge of matrix algebra. Three hours. Mr. Eldred.

271 PRESTRESSED CONCRETE STRUCTURES (3-0) Comparison of service and ultimate strength theories for concrete structures with emphasis on prestress effects; topics considered include prestressed beam analysis, load balancing methods, columns, and piles, bent analysis, yield-line theory, and circular prestressing in domes and tanks; and discussion of current design specifications. *Prerequisite:* 173. Three hours. Mr. Dunham.

280 APPLIED SOIL MECHANICS (3-0) Use of soil mechanics principles in the evaluation of building foundations, braced excavations, and earth structures; and bearing capacity, settlements in sands and clays, lateral earth pressures, pile foundations, pier and caisson foundations, slope stability, and construction problems. *Prerequisite:* 180. Three hours. Mr. Olson.

281 HIGHWAY AND AIRPORT PAVEMENT DESIGN (3-0) Structural design of flexible and rigid pavements; types of wheel and axle configurations; soil classification; compaction of soils; frost action; subsurface drainage; design of bases and subbases; soil stabilization, theory of stresses in flexible pavements; plate bearing, triaxial and CBR methods of design; Westergaard analysis for rigid pavements; design of joints and reinforcing steel; and pavement evaluation. *Prerequisite:* 140, 180. Three hours. Mr. Olson.

282 ENGINEERING PROPERTIES OF SOILS (2-3) The study of soil properties that influence the engineering behavior of soils as a construction and foundation material; subject areas include soil mineralogy, physicochemical concepts, plasticity properties, premeability, compaction, and soil stabilization; and laboratory work in the study of soil index properties, permeability, and compaction tests. *Prerequisite:* 180. Three hours. Mr. Olson.

290 ENGINEERING INVESTIGATION (3-0) Independent investigation of a special topic under the guidance of a staff member. The course work may consist of literature investigations, unique design problems, and/or laboratory and field studies. Preparation of an engineering report is required. *Prerequisite:* senior standing or departmental permission. Three hours. Staff.

Engineering, Electrical

COLLEGE OF TECHNOLOGY

Professors Roth (Chairman), Essler, Handelsman, Lai, Lambert and Rush; Associate Professors Evering, and Taylor; Assistant Professors Absher, Ellis, Mirchandani, and Williams.

2 ENGINEERING ANALYSIS I (2-0) Concepts of linearity. System elements and their models. Interconnection of system elements. Vectors and matrices. Solution of linear simultaneous equations. Kirchoff's laws and equilibrium equations. Electrical networks and their analogies. *Prerequisite:* mathematics 11 or 13. Two hours.

3 ENGINEERING ANALYSIS II (3-0) Input-output relations of systems. Ordinary linear differential equations with specific application to linear systems. Response of systems to exponential excitation and concept of complex frequencies. Impulse response. Steady-state response of linear systems. System functions. Resonance. Network theorems. Energy and power. *Prerequisite:* 2. Three hours.

4 ENGINEERING ANALYSIS III (3-0) Signal flow graphs. Simulation of systems by analog computers. Transient response of linear systems. State-space approach. Response of mechanical systems, electromechanical systems, acoustic systems, magnetic networks, etc. *Prerequisite:* 3. Three hours.

31 ENGINEERING COMPUTATION I (2-0) Analog and hybrid computing devices. Simulation of linear algebraic and dynamic systems. Various mathematical operations. Non-linear problems. Conversion between analog and digital domains. Scaling. *Prerequisite:* concurrent enrollment in Math. 123. Two hours.

32 ENGINEERING COMPUTATION II (2-0) Introduction to digital computers. Hardware and software structure. Solution of electrical engineering problems using digital computer techniques. *Prerequisite:* E.E. 31. Two hours.

101, 102 ELECTRICAL ENGINEERING PRINCIPLES (3-3) Principles of electric and magnetic circuits; application of these principles to the theory and performance of selected power, control and communication equipment. *Prerequisite:* mathematics 123 and physics 27, 101 for 102. Four hours.

111 CONTROL SYSTEMS (3-0) Theoretical background for analysis and synthesis of feedback control systems. Concepts of stability, transfer functions, signal flow, performance criteria, compensation and the classical root-locus and frequency response methods. State variable approaches. Analog simulation as a design tool. *Prerequisite:* 4. Three hours.

113 ENERGY CONVERSION I (3-0) Principles basic to electromechanical energy conversion devices and systems. Concepts associated with the interchange of energy among electrical magnetic and mechanical circuit elements. Continuous energy conversion in the ideal and practical rotating machine. Machine dynamics. *Prerequisite:* 4. Three hours.

114 ENERGY CONVERSION II (3-0) Six basic methods of Direct Energy Conversion (DEC): thermoelectric devices, thermionic devices, magnetohydrodynamic (MHD) converters, solar cells and fuel cells, electrohydrodynamic (EHD) converters. Modern solid state theories of DEC. The past, present, and future of DEC. *Prerequisite:* 113, 163. Three hours.

121 ELECTRONICS I (3-0) Properties of semiconductors. PN junctions. Application of diodes. Circuit models for transistors, vacuum tubes, and other active devices. Biasing techniques and regions of operation. *Prerequisite:* 4. Three hours.

122 ELECTRONICS II (3-0) Properties of amplifiers. Amplifier design. Feedback and oscillation in electronic circuits. High-frequency circuit models and limitations. *Prerequisite:* 121. Three hours.

123 ELECTRONICS III (3-0) Analysis of pulse and digital circuits. Design of transistor logic gates, multivibrators, and blocking oscillators. *Prerequisite:* 122. Three hours.

143, 144 ELECTROMAGNETIC FIELD THEORY (3-0) Basic laws and elementary applications of electromagnetic fields; electrostatics, magnetostatics, Faraday's law, Maxwell's equations, plane waves, transmission lines, waveguides, and antennas. *Prerequisite:* 4. Three hours.

146 WAVE AND DIFFUSION ANALOGIES (3-0) Electromagnetic waves on lines in space. Vibration of strings and membranes. Mechanical waves in fluids and solids. Electromechanical transducers. Thermal waves. Diffusion process. *Prerequisite:* 144. Three hours.

162 SOLID STATE PHYSICAL ELECTRONICS I (3-0) Theories of conductivity, dielectric constant, magnetic permeability, optical properties, piezoelectricity, ferroelectricity, pyroelectricity, magnetostriction. *Prerequisite:* physics 128. Three hours.

163 SOLID STATE PHYSICAL ELECTRONICS II (3-0) Introduction to the physics of atoms and crystals through quantum and statistical mechanics. Application of these principles to semiconductor devices. *Prerequisite:* 162, physics 128. Three hours.

171 SIGNALS AND SYSTEMS (3-0) Fourier series and Fourier integral. Pulse, periodic, and random signals and their spectra. Correlation functions and power spectra of signals. Transmission of signals through linear systems. *Prerequisite:* 4, mathematics 203. Three hours.

174 INFORMATION-TRANSMISSION SYSTEMS (3-0) Introduction to information transmission. Modulation and demodulation. Noise and noise figures. Comparison of information transmission systems. Transmission lines and propagation. *Prerequisite:* 171. Three hours.

Laboratories

Each student will keep a laboratory notebook which will be collected and checked periodically by the instructor. He will prepare one experiment in a form suitable for publication and will present his paper to the class and other interested persons. The student will be graded on the notebook as well as the final written and oral presentation.

81 SOPHOMORE LABORATORY (0-3) Direct current measurements, nonlinear resistive elements, electron ballistics, the cathode ray oscilloscope, transients in RC circuits, alternating current measurements, sinusoidal behavior of RL and RC circuits, transients and sinusoidal behavior of RLC circuits. One hour.

82 SOPHOMORE LABORATORY (1-3) Alternating current bridges, resonant harmonic analyzer, acoustic resonance, measurement of charge, current, voltage, power, resistance, capacitance, inductance, and time. *Prerequisite:* 81. Two hours.

183 JUNIOR LABORATORY (1-3) Two dimensional field mapping; electrostatic field plots, duals, and analogs; magnetic fields and circuits; magnetic forces and the magnetic field as an energy source. Input-output characterizations of linear time invariant systems. Introduction to active circuits; amplification and oscillation. *Prerequisite:* 82. Two hours.

184 JUNIOR LABORATORY (1-3) Active device characteristics, Power supplies, a.m. and f.m. modulation and detection. Transformers, magnetic amplifiers, a-c and d-c machines. *Prerequisite:* 183. Two hours.

185 SENIOR LABORATORY (1-3) Electrical conductivity in solids, the Hall effect, properties of gaseous conductors and dielectric materials. Control systems. Electromechanical transducers. *Prerequisite:* 184. Two hours.

186 SENIOR LABORATORY (0-3) Design and construction of pulse and digital circuits including logic gates, astable multivibrators, bistable multivibrators, monostable multivibrators, and locking oscillators. *Prerequisite:* 185. One hour.

187, 188 SENIOR PROJECT (0-3), (0-3) Experimental or theoretical project selected by the student and conducted under staff supervision. One hour.

201 LINEAR SYSTEM THEORY (3-0) Introduction to linear system theory and application to the processing and control of information. Mathematical models and classification of systems. Lagrangian and Hamiltonian formulation. Time-invariant and time-varying differential systems. Characterization by impulse response and integral transforms. Methods of analysis. Adjoint system and implications. Characterization and analysis of linear discrete-time systems. *Prerequisite:* Math 124 or equivalent background. Three hours. Staff.

202 NETWORK ANALYSIS (3-0) Introduction to modern network analysis through a topological study of networks with emphasis on electrical networks. Graph theory. Fundamental principles and theorems. State variable characterization of linear, nonlinear and time-varying networks. Other methods of characterization. Analysis using linear algebra concepts. Computational problems. *Prerequisite:* EE 171 and Math 124 or equivalent background. Three hours. Mr. Mirchandani.

205, 206 NETWORK SYNTHESIS (3-0) Design of linear and nonlinear networks using the digital computer. Review of classical realizability theory of passive networks. Computer oriented topics including: Linear algebraic computational and numerical integration problems. Concepts of modelling. Optimization methods. Worst case design. Use of analysis programs. Discussion of recent methods and developments. *Prerequisite:* 202. Knowledge of programming helpful but not necessary. Three hours. Mr. Mirchandani.

230 DIGITAL COMPUTER LOGIC, CIRCUITS AND SYSTEMS (3-0) The logical design digital computers. Boolean algebra as an aid to circuit design. Circuits and components for the transmission, storage and modification of information and their combination into arithmetic units, memory devices, program controls and other major mechanisms. *Prerequisite:* 123 or physics 213. Three hours. Staff.

232, 233 HYBRID COMPUTERS (3-0) Systems design concepts and use of interconnected analog and digital computers as an engineering tool are stressed. Selected problems from mathematics, biological and physical sciences are solved on a hybrid computer. The use of logic and decision as well as analog/digital and digital/analog conversion are stressed. *Prerequisite:* 123 or departmental permission. Three hours.

235 ELECTRONIC INSTRUMENTATION FOR SCIENTISTS (3-3) Introduction to electrical components and circuit theory, electrical measurements, oscilloscopes, power supplies, amplification by vacuum tubes and transistors, oscillators, comparison measurements, servo systems, operational amplifiers for measurement and control, electronic switching circuits, timing and digital counting systems. This course may not be taken for credit by students in Electrical Engineering. *Prerequisite:* College physics and calculus or permission of the instructor. Four hours. Mr. Evering.

236, 237 FUNDAMENTALS OF DIGITAL COMPUTER DESIGN (3-0), (3-0) Fundamentals of logic design. Design of combinational and sequential logic circuits. Implementation of arithmetic operations. Memory systems. Instruction codes. Dynamic storage allocation. No graduate credit for electrical engineering majors. *Prerequisite:* Math 116 or E.E. 32 or equivalent, 236 for 237. Three hours.

239 TRANSIENT PHENOMENA (3-0) Study of complex variable basis of Laplace and Fourier Transforms; applications to transient behavior of lumped and distributed parameter systems, root locus. Nyquist criterion and two dimensional field problems. *Prerequisite:* 4. Three hours. Mr. Rush.

240 BOUNDARY VALUE PROBLEMS IN ELECTROMAGNETISM (3-0) Solution of classical problems of electromagnetism using images, conformal mapping and separation of variables methods. *Prerequisite:* 144. Three hours. Mr. Rush.

242 THEORY AND APPLICATIONS OF TIME-VARYING FIELDS (3-0) Maxwell's Equations and boundary conditions for time varying systems. Propagation and reflection of electromagnetic waves, guided electromagnetic waves, resonant cavities, and microwave networks. *Prerequisite:* 240 or departmental permission. Three hours. Mr. Evering.

244 RADAR SYSTEMS ENGINEERING (3-0) Radar theory including antennas, propagation, signal detection and parameter estimation. Applications including search and track radars, aircraft control and landing, radio/radar astronomy, and modern phased array radars. *Prerequisite:* EE 174. Three hours. Mr. Handelsman.

251 APPLICATIONS OF LINEAR ALGEBRA (3-0) Introduction of basic definitions and concepts of linear algebra; formulation and solution of engineering problems. Definitions of linear vector and function spaces, subspaces and manifolds, linear operators, change of basis, spectral representation of operators, the eigenvalue problem, matrices and functions of matrices. Application to problems of state variable analysis, field theory, mechanics, quantum mechanics and signal theory. *Prerequisite:* Graduate standing in EE or Physics or departmental permission. Three hours. Mr. Rush.

261 TRANSISTOR ENGINEERING (3-0) Introduction to energy band theory and the effective mass concept. Analysis of the transport properties of holes and electrons. Characteristics of PN junctions. Theory of transistors as developed from drift and diffusion properties of carriers. Charge control model of transistor switch. *Prerequisite:* mathematics 121 or 123. Three hours. Mr. Lambert.

262 TRANSISTORS (3-0) The fundamental principles of semi-conductor operation. P and N type conductivity; the PN junction; construction of the junction transistor. Circuit analysis of transistor operation in terms of hybrid parameters. Equivalent circuits for high frequency operation; oscillators and pulse switching circuits. *Prerequisite:* 261. Three hours. Staff.

272 INFORMATION THEORY (3-0) Introduction to probability concepts of

information theory; entropy of probability models; theoretical derivations of channel capacity; coding methods and theorems, sampling theorems. *Prerequisite:* mathematics 203. Three hours.

281 through 284 SEMINAR (1-0) Presentation and discussion of advanced electrical engineering problems and current developments. *Prerequisite:* senior or graduate engineering enrollment. One hour.

285 CREATIVE ENGINEERING (3-0) Creative techniques and applications to typical problems of commercial importance in fields of process control, biomedical engineering communications, circuit design. *Prerequisite:* graduate standing in EE or departmental permission. Three hours. Mr. Roth.

287, 288 SPECIAL TOPICS (3-0) Formulation and solution of theoretical and practical problems dealing with electrical circuits, apparatus, machines or systems. *Prerequisite:* 4. Three hours.

Engineering, Mechanical

COLLEGE OF TECHNOLOGY

Professors von Turkovich (Chairman), Berry, Outwater, and Tuthill; Associate Professors Carpenter, Duchacek, Hundal, Marshall, Martinek, and McLay; Adjunct Professors Zubko and Kennedy.

1 ENGINEERING GRAPHICS I (0-6) Basic geometrical construction, free-hand sketching and lettering, charts and graphs, orthographic projection and applications of orthographic principles to typical engineering problems. Introduction to descriptive geometry. Two hours.

2 ENGINEERING GRAPHICS II (0-6) A continuation of the application of orthographic principles to technical problems covering intersections and development. Axonometric projection. *Prerequisite:* 1. Two hours.

53 MANUFACTURING PROCESSES (2-3) Theory and principles of casting and molding, metal forming, welding, machining and finishing processes with emphasis on economics and design. *Prerequisite:* 2. Three hours.

73 CREATIVE DESIGN (3-0) Application of fundamental engineering principles to the solution of real engineering problems through formulation, selection, synthesis, analysis, optimization, oral and written presentation. *Prerequisite:* sophomore standing in ME. Three hours.

92 THERMODYNAMICS I (3-0) Engineering thermodynamics with particular emphasis on energy forms, the development of thermodynamics laws, equilibrium, fixed and variable mass systems, reversibility, and entropy. *Prerequisite:* mathematics 14, physics 18. Three hours.

111 THERMODYNAMICS II (3-3) Properties and processes of fluids; the perfect gas, and approximate relationships for real gases; application of thermodynamics principles to areas such as combustion, mixtures, power cycles, gas compression, and refrigeration. Laboratory on problems and analysis. *Prerequisite:* 92. Three hours.

113 THERMODYNAMICS AND HEAT TRANSFER (3-0) Fundamental principles of

engineering thermodynamics; application of these principles to thermodynamic cycles; heat transfer. *Prerequisite:* physics 18; mathematics 14. Three hours.

115 THERMODYNAMICS (3-0) The first and the second law of the classical thermodynamics; introduction to statistical mechanics, Boltzmann, Bose-Einstein and Fermi-Dirac statistics, partition function; microcanonical, canonical and grand canonical ensembles; kinetic theory of gases; introduction to statistical thermodynamics; derivation of thermodynamic properties of perfect gases and solids; Maxwell relations; chemical equilibrium; the behavior of real gases and liquid; phase equilibrium and multicomponent systems. *Prerequisite:* physics 28, mathematics 14. Three hours.

119 ENGINEERING EXPERIMENTATION (1-1) Engineering Measurements; experimental error; test sequences; data analysis. Experiments using the project method to investigate engineering principle, instrument capability and the theory of experimentation. *Prerequisite:* junior standing. Two hours.

131 MATERIALS PROCESSING I (2-3) The fundamentals of forming and material removal in the solid state, in particular, underlying aspects of plastic deformation, energy requirement and overall economics are stressed. *Prerequisite:* CE 100. Three hours.

133 DYNAMICS I (3-0) Fundamentals of kinematics; analysis and synthesis of displacement, velocity and acceleration with respect to fixed and moving frames of reference; principles of particle and rigid body motion; conservation principles of dynamics and their application in the solution of dynamics problems; dynamic analogies between mechanical, fluid and electrical systems. *Prerequisite:* CE 01. Three hours.

135 ENGINEERING DESIGN I (3-3) Application of the principles of kinematics, dynamics, strength of materials and design to the design of machine elements including consideration of function; production and economic factors; with special emphasis on engineering mechanics. *Prerequisite:* 133, CE 100. Four hours.

137 SYSTEMS CONTROL (2-0) Concepts of control, stability and interaction of systems with particular reference to design of mechanical, pneumatic, hydraulic and other control circuits. *Prerequisite:* mathematics 271. Two hours.

142 FLUID MECHANICS (3-0) Dynamics of an ideal fluid; energy and momentum relations; similitude flow in conduits; boundary layer mechanics; compressibility phenomena; wing theory; hydrodynamic lubrication; fluid machines and controls. *Prerequisite:* 111 or 113, 133. Three hours.

171 INDUSTRIAL MATERIALS I (3-0) Fundamentals of ferrous and non-ferrous physical metallurgy, and nonmetallic materials. The correlation of the microscopic structure and physical properties of metals, ceramics and plastics with their heat treatments and uses. *Prerequisite:* chemistry 2; physics 18. Some laboratory work required. Three hours.

174 INDUSTRIAL ENGINEERING (3-0) Principles of industrial organization, plant facilities and layout, production and quality control, motion and time study, wage incentives and job evaluation. *Prerequisite:* inspection trip. Three hours.

175 METHODS ENGINEERING (2-3) Work methods analysis and design, introduction to human engineering. Work measurement including stop watch study, work sampling and predetermined data. *Prerequisite:* junior standing. Three hours.

176 PLANT ORGANIZATION (3-3) Analysis of industrial plant requirements as to layout and materials handling; plant services and maintenance. *Prerequisite:* junior standing. Four hours.

191, 192 THESIS (0-9) Investigation of a research or design project under the supervision of an assigned staff member culminating in an acceptable thesis. *Prerequisite:* senior standing and departmental permission. Three hours.

202 DYNAMICS II (3-0) Advanced topics in dynamics of particles and systems of particles. Space motion in fixed and moving frames of reference. Impulse and momentum. Central force motion. Kinematics and kinetics of rigid bodies. Euler's equations of motion. Gyroscopic effects in mechanical systems. *Prerequisite:* 133. Three hours. Staff.

203 MECHANICAL VIBRATIONS (3-0) Vibration phenomena in single and multi-degree of freedom systems. Response of systems to periodic and transient excitation. Isolation of shock and vibration. Impedance; matrix and numerical methods for vibration problems. *Prerequisite:* senior standing. Three hours. Mr. Hundal.

204 ADVANCED SYSTEMS ANALYSIS (3-0) Lumped-parameter and distributed-parameter systems analysis of mechanical thermal, hydraulic, pneumatic and electromechanical systems; system response to periodic, transient and random excitation. *Prerequisite:* senior standing. Three hours. Staff.

206 APPLICATION OF COMPUTERS IN ENGINEERING (4-0) Utilization of analog, digital and hybrid computers as engineering tools for the solution of complex engineering problems. *Prerequisite:* senior standing. Four hours. Staff.

211 ADVANCED MECHANICAL STRUCTURE I (3-0) Statically indeterminate problems in bending; general expression of strain energy; theorem of Castigliano and the unit load method; theory of curved beams; beams on elastic foundations; unsymmetrical bending; torsion of thin sections. *Prerequisite:* senior standing. Three hours. Mr. McLay.

222 ADVANCED MECHANICAL STRUCTURES II (3-0) Theory and applications of the force, and displacement matrix methods of analysis; basic theory of elasticity including analysis of stress, the equilibrium equations; analysis of strain, the compatibility equations, and generalized Hooke's law; introduction to plasticity; problems of plane stress and plane strain; finite differences and variational methods. *Prerequisite:* senior standing. Three hours. Mr. McLay.

231 MATERIALS PROCESSING II (2-3) Fundamentals of forming from liquid state, plastics forming, metal joining, powder metallurgy. *Prerequisite:* 113, CE 100. Three hours. Mr. Berry.

233 STATISTICAL TECHNIQUES IN MANUFACTURING (3-0) Quality control engineering methods including correlation, variance and time series analysis. Principles of experimental design and operating research in manufacturing. *Prerequisites:* 53 or 131, Math 31, Math 200. Three hours. Staff.

243 ADVANCED FLUID MECHANICS (3-0) Foundations of compressible flow; isentropic flow; normal and oblique shock waves; Prandtl-Myer flow; flow with friction and with heating and cooling; flow in electric and magnetic fields; potential flow; linearized flows; method of characteristics. *Prerequisite:* 142. Three hours. Mr. Duchacek.

244 COMPRESSIBLE FLOW (3-0) Introduction to flow in two and three dimensions; steady irrotational flow; small perturbations; the hodograph method;

the Karman-Tsien, Prandtl-Glauert, and Gothert's methods; supersonic airfoils; the method of characteristics; oblique shocks; shock waves and boundary layer interaction. *Prerequisite:* 243. Three hours. Mr. Duchacek.

245 ADVANCED FLUID MECHANICS LABORATORY (0-3) Mechanics of fluids with emphasis on compressible flow; flow-measurement; fluid machinery; aerodynamics; compressible flow in nozzles and ducts; high Mach number effects; field mapping. *Prerequisite:* 243 or concurrent enrollment therein. One hour. Mr. Duchacek.

246 AERODYNAMICS (3-0) Application of the principles of fluid mechanics to the design and performance of aircraft; fluid dynamics; experimental facilities; airfoil characteristics; aspect ratio and plan-form influences; viscosity phenomena as applied to boundary layer; transition and separation on various shapes; compressibility phenomena; the optimum airfoil; performance. *Prerequisite:* 142. Three hours. Mr. Duchacek.

252 ENGINEERING DESIGN II (3-3) Application of the principles of kinematics, dynamics, strength of material, fluid mechanics and thermodynamics to the design of mechanical systems and their components; application of computers to design; design optimization; group projects in design; construction and evaluation. *Prerequisite:* 135. Four hours. Mr. Carpenter.

262 THERMAL SYSTEMS (3-3) Application of engineering thermodynamics to the analysis of thermodynamic machines and processes; problems on gas turbine, jet propulsion, nuclear power plants, energy conversion devices and other areas of current interest. *Prerequisite:* senior students. Four hours. Mr. Tuthill.

264 THERMAL ENVIRONMENTAL ENGINEERING (3-0) The principles of psychrometrics, heat transfer and fluid mechanics applied to thermal environments and their control for man, animal or process. *Prerequisite:* 111, 142, 266. Three hours.

266 HEAT TRANSFER (3-0) Fundamental principles of heat transfer; conduction, convection, radiation; steady and unsteady state; the electric analogy; applications to heat transfer equipment. *Prerequisite:* 111 or 113 and mathematics 271. Three hours. Mr. Duchacek.

267 ADVANCED THERMODYNAMICS (3-0) A rigorous detailed study of the laws of thermodynamics and of ideal and actual thermodynamic processes. *Prerequisite:* 111 or 113 and mathematics 271. Three hours. Mr. Tuthill.

271 INDUSTRIAL MATERIALS II (3-0) The composition, structure, mechanics and fabrication of polymeric materials. The mechanism of adhesion. Deformational mechanics of crystalline materials. *Prerequisite:* 171. Three hours. Mr. Outwater.

272 MECHANICAL BEHAVIOR OF MATERIALS (3-0) Elastic and plastic behavior of single crystals and polycrystals; dislocations; approximate plastic analysis; anisotropic materials; hardness; residual stress, brittle, transitional and ductile fractures; fatigue; damping; creep and surface phenomena. *Prerequisite:* senior standing. Three hours. Mr. Outwater.

281, 282 SEMINAR (1-0) Presentation and discussion of advanced mechanical engineering problems and current developments. *Prerequisite:* senior or graduate engineering enrollment. One hour. Staff.

284 ADVANCED HEAT ENGINES (3-0) Application of engineering science to specific types of heat engines according to the interest of the students. *Prerequisite:* 111, 142, 266. Three hours. Staff.

294 **ENGINEERING DESIGN ANALYSIS AND SYNTHESIS (4-0)** The application of the fundamental concepts and principles of mathematics, physics, mechanics, electricity, thermodynamics, fluid dynamics and heat transfer combined with economic considerations and decision-making processes to the rigorous training in the design, analysis and synthesis of engineering systems and their components. *Prerequisite:* senior standing. Four hours. Staff.

295, 296 **SPECIAL TOPICS (3-0)** Advanced study and discussion in areas dependent on the interest of the students. *Prerequisite:* senior or graduate standing and departmental permission. Three hours. Staff.

297 **NUCLEAR ENGINEERING (3-0)** Neutron chain reactions and the criticality condition; the slowing down of neutrons in an infinite medium; one-speed diffusion of neutrons in a multiplying and non-multiplying system combined slowing down and diffusion; bare and reflected homogeneous reactors; time-dependent behavior of reactors; reactor control theory; reactor accident and transient analysis. *Prerequisite:* senior standing. Three hours. Staff.

English

COLLEGE OF ARTS AND SCIENCES

Professors Bandel, Bogorad, Cochran, Jones, Long, Orth and Rothwell (Chairman); Associate Professors Broughton, Poger, and Shepherd; Assistant Professors Biddle, Clark, Dickerson, Edwards, Eschholz, Gutman, Hall, Howe, Huddle, Rosa, Seid, Stanton, and Stephany; Instructors Bradley, Campolucci, and Simone. Adjunct faculty, Duffy.

Unless otherwise indicated, all courses in the Department of English carry three hours of credit.

1 **WRITTEN EXPRESSION** Primarily a course in writing with some selected readings as examples of style and ways of treating similar content. Staff.

3, 4, 5, 6, 7, 8 **GENRE COURSES** Specific genres of which the following are examples will be selected each semester: Poetry, Fiction, Drama, Epic, and Biography. Writing of relevant essays required. Staff.

9, 10, 11, 12 **THEMATIC COURSES** The treatment of a particular theme in a selected group of literary works. Themes will be drawn from such concepts as The Hero, The City, The American Dream, and The Counter-Culture. Writing of relevant essays required. Staff.

13 **INTRODUCTION TO THE ENGLISH LANGUAGE** Topics will include consideration of language as a part of human behavior, history of the language, dialects of American English, lexicography, and the new analysis of English. Staff.

16 **EXPOSITORY WRITING** *Prerequisite:* sophomore standing. Mr. Howe, Mr. Eschholz.

17 **CREATIVE WRITING** *Prerequisite:* sophomore standing. Mr. Broughton, Miss Edwards, Mr. Huddle.

18 **CREATIVE WRITING** An intermediate writing course. *Prerequisite:* 17. Mr. Broughton, Miss Edwards, Mr. Huddle.

21, 22 BRITISH LITERATURE Staff.

23, 24 AMERICAN LITERATURE Staff.

25, 26 WORLD LITERATURE Staff.

Unless otherwise indicated, the prerequisite for any course in the Department of English numbered 99 to 199 is three hours of English and Sophomore standing.

✓ 101 CHAUCER Mr. Stephany.

✓ 107, 108 SHAKESPEARE Miss Bandel, Mr. Howe, and Mr. Rothwell.

121, 122 THE ROMANTIC PERIOD Mr. Jones, Mr. Stanton.

133, 134 THE DEVELOPMENT OF AMERICAN LITERATURE The emergence and growth of a national literature. First semester: Colonial times to the Civil War; second semester: from the Civil War to the present. Mr. Poger and Mr. Shepherd.

135, 136 CANADIAN LITERATURE The development of a national literature. Required of students in the Canadian Area Studies Program. Staff. Alternate years.

✓ 138 MODERN BRITISH NOVEL Mr. Stanton.

140 MODERN SHORT FICTION Mr. Cochran, Mr. Gutman, Mr. Jones, and Mr. Shepherd.

✓ 141 MODERN AMERICAN NOVEL American novelists from 1915 to 1945. Mr. Biddle, Mr. Cochran, Mr. Eschholz, Mr. Gutman, Mr. Poger, Mr. Shepherd.

142 CONTEMPORARY AMERICAN NOVEL Significant American novelists since 1945. Mr. Cochran, Mr. Gutman, Mr. Shepherd.

143 LITERATURE OF BLACK AMERICA Poetry, fiction, and drama by black writers since the turn of the century. Mr. Gutman, Mr. Orth.

151 PHILOSOPHY AND LITERATURE See Philosophy.

159 CONTEMPORARY AMERICAN POETRY American Poetry since 1950. Miss Edwards.

161 UTOPIAN AND ANTI-UTOPIAN FICTION Themes and literary characteristics of selected English and American utopias and dystopias from the Renaissance to the present. Mr. Bogorad.

177-178 ADVANCED CREATIVE WRITING A workshop. Students follow their own interests in poetry, prose, fiction, and drama. Permission of instructor required. *Prerequisite:* 17. Mr. Broughton, Miss Edwards, Mr. Huddle.

182 SEMINAR FOR PROSPECTIVE TEACHERS OF ENGLISH GRAMMAR AND LANGUAGE Literary interpretation and criticism; allied problems useful to teachers of English. *Prerequisite:* 16, 261. Mr. Biddle.

192 MAJOR DEVELOPMENTS IN ENGLISH LITERATURE Studies in literary periods, movements and ideas. Primarily for seniors concentrating in English. *Prerequisite:* senior standing and English major. Staff.

193, 194 COLLEGE HONORS. Not to exceed 3 hours per semester.

195, 196 SPECIAL TOPICS Not to exceed 3 hours per semester.

197, 198 READING AND RESEARCH Not to exceed 3 hours per semester.

Unless otherwise indicated, the prerequisite for any course numbered 199 to 299 is three hours of English and Junior standing.

200 OLD ENGLISH The sounds, words, and structure of Old English; simple prose texts and selections from *Beowulf*. Mr. Dickerson. Alternate years, 1973-74.

202 **MEDIEVAL LITERATURE** The forms (in translation) of medieval literature, with emphasis on Arthurian materials. Mr. Stephany.

204 **MIDDLE ENGLISH** Literary, historical, and linguistic considerations of Middle English texts, excluding Chaucer. Mr. Dickerson. Alternate years, 1972-73.

205-206 **ENGLISH DRAMA TO THE CLOSING OF THE THEATRES** First Semester: From the drama in the Middle Ages to Marlowe and Jonson. Second Semester: Jacobean Drama (exclusive of Shakespeare), to include Webster, Tourneur, and Ford, to the closing of the Theatres in 1642. Staff.

209, 210 **ELIZABETHAN PROSE AND POETRY** The major writers of the Tudor and Stuart periods. Mr. Long. Alternate years, 1973-74.

212 **MILTON** *Paradise Lost*, *Paradise Regained*, *Samson Agonistes*, some minor poems, and selected prose works. Mr. Bogorad.

217 **RESTORATION AND EIGHTEENTH-CENTURY DRAMA** Development of English drama from Dryden to Sheridan. Mr. Howe, Mr. Seid. Alternate years, 1972-73.

218 **RESTORATION AND EIGHTEENTH-CENTURY PROSE AND POETRY** Significant writers from Dryden to Johnson. Mr. Bogorad. Alternate years, 1972-73.

227, 228 **ENGLISH NOVEL** English fiction from its origin through the nineteenth century. Mrs. Hall.

231, 232 **VICTORIAN LITERATURE** Significant writers from 1832 to 1900. Mr. Long. Alternate years, 1972-73.

235 **MODERN BRITISH DRAMA** British and continental plays of the 19th and 20th centuries. Staff.

236 **MODERN AMERICAN DRAMA** Recent and contemporary. Mr. Orth.

239 **MODERN BRITISH POETRY** Mr. Poger.

242 **LITERATURE OF THE SOUTHERN RENAISSANCE** Selected short stories, novels, and poetry by Glasgow, Faulkner, Warren, Tate, Styron, and others. Mr. Shepherd. Alternate years, 1973-74.

244 **MODERN IRISH LITERATURE** Irish literature from 1890 to the present. Mr. Bradley. Alternate years, 1973-74.

251, 252 **AMERICAN NOVEL OF THE NINETEENTH CENTURY** First semester: Hawthorne, Melville, and others; second semester: Twain, Howells, James and others. Mr. Biddle, Mr. Eschholz, Mr. Shepherd.

253 **AMERICAN COLONIAL LITERATURE** Intellectual and literary origins, in the seventeenth and eighteenth centuries, of American culture. Mather, Taylor, Edwards, Franklin, Jefferson, Freneau and Brown. Mr. Rosa.

254 **EMERSON, THOREAU AND THEIR CIRCLE** Mr. Orth. Alternate years, 1973-74.

256 **REGIONAL WRITING IN AMERICA** Selected works by Cooper, Harte, Garland, Twain, Faulkner, and others, including units on local color and Southwest humor. Mr. Cochran. Alternate years, 1973-74.

257 **AMERICAN POETRY TO WORLD WAR I** Major American poets to 1917, including Poe, Whitman, Dickinson, and others. Mr. Cochran, Mr. Orth.

258 **MODERN AMERICAN POETRY** Major American poets from World War I to 1950. Miss Edwards, Mr. Poger.

261 **STRUCTURE OF THE ENGLISH LANGUAGE** Descriptive study of Modern American English. Mrs. Clark.

262 **HISTORY OF THE ENGLISH LANGUAGE** The principles of historical linguistics and their application to English. Mrs. Clark. Alternate years, 1972-73.

264 **ENGLISH STYLISTICS** Introduction to English stylistics through consideration of changing conceptions of style, evaluation of selected methods of stylistic analysis, and comparison of various literary styles. Mrs. Clark. Alternate years, 1973-74.

266 **AMERICAN ENGLISH DIALECTS** The emergence of American English with special attention to dialectology. *Prerequisites:* English 13, Linguistics 101 or by permission of the Instructor. Mr. Eschholz.

273 **TECHNIQUE AND CRITICISM OF POETRY** Intensive analysis of various kinds of poetry to develop appropriate critical methods and standards. Mr. Bogorad.

275 **HISTORY OF CRITICISM** Principles and theories of criticism from Aristotle to the twentieth century. Mrs. Hall, Mr. Stanton. Alternate years, 1973-74.

276 **CONTEMPORARY CRITICISM** Mr. Poger.

278 **MODERN TRADITION** Special topics necessary for the understanding of the critical, intellectual and literary works of the modern period: Symbolism, Realism, Self-consciousness, Nature, the Unconscious, Myth and others. Mr. Poger.

Extra-Departmental Courses

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Environmental Studies Program

EP 1, 2 **ENVIRONMENTAL STUDIES** An introductory interdisciplinary course which considers the humanistic, societal, scientific and technological aspects of man's attempt to preserve his environment. *Prerequisites:* Freshman standing. Three Hours. Mr. Godfrey, Mr. Parker, Mr. Wagner and staff.

99 **ENVIRONMENTAL QUALITY** An introduction to the problems associated with an expanding population faced with pollution, restoration, and preservation of the environment. Three hours. Mr. Parker and Staff. See page 231 under Plant and Soil Science.

110 **WATER POLLUTION HYDROLOGY** Introduction to theoretical and practical considerations of physical and biological pollution in the hydrologic cycle; land use and water quality relationships; transfer of atmospheric pollutants to streams; the significance of pollution economically, politically and culturally. *Prerequisite:* departmental permission. Three hours. Staff. See page 231 under Plant and Soil Science.

191 **ENVIRONMENTAL PRACTICUM** A field project with work on some environmental problem giving the student practical experience. Students may

enroll more than once. Credit to be arranged. *Prerequisite:* Permission of instructor and junior standing. Staff.

195, 196 **ADVANCED ENVIRONMENTAL QUALITY** Analysis of problems of the environment; solutions; practical methods; problem solving mechanisms and decision making; theoretical, technological, and sociological influences. Integrated treatment through an interdisciplinary approach. *Prerequisite:* Senior standing or permission of the instructor; 195 for 196. Three hours. Staff.

Recreation Resource Management Program

75 **PARTICIPATION IN RECREATION MANAGEMENT** Supervised field experience in national, state, urban or private park and recreation operations. *Prerequisites:* Sophomore standing and permission of recreation management committee. Three hours. I, II. Mr. Fuller, Mr. Gilbert, Mr. Lindsay, Mr. Greig and Mr. Schmidt. See page 239 under Resource Economics.

COLLEGE OF ARTS AND SCIENCES

General Literature

61, 62 **GERMAN LITERATURE IN TRANSLATION** Lectures on the development of German literature; reading and discussion of representative works in English translations. No knowledge of German required. *Prerequisite:* sophomore standing and one year course in any literature. Three hours. Miss Richel.

81, 82 **RUSSIAN LITERATURE IN TRANSLATION** First semester: Russian masters of the nineteenth century. Second semester: twentieth century writers from the symbolists to the present. *Prerequisite:* sophomore standing and one year course in any literature. Three hours. Mr. Nalibow.

101, 102 **LINGUISTICS** An introductory course designed to acquaint the student with the methods and theory of systematic observation and explanation of language phenomena (linguistics). *Prerequisite:* 101 for 102. Three hours.

151, 152 **DEVELOPMENT OF PROSE FICTION** First semester: Latin, Spanish, French; second semester: French, Russian, English, and Italian. Three hours.

Meteorology

161 **INTRODUCTORY METEOROLOGY** An introductory study of weather elements and the dynamic process under which they combine and act. Special consideration of the interaction of earth and atmosphere. *Prerequisite:* mathematics 11; a year of college chemistry (1-2), geology, or physics. Three hours. Mr. Vollkommer.

Pharmacology

290 **PHARMACOLOGY (4-3)** See course description under Pharmacology, page 223.

COLLEGE OF TECHNOLOGY

7 **MAN'S PLACE IN THE UNIVERSE (1-0)** See course description under Technology, page 245.

51 **TECHNOLOGY AND SOCIETY (3-0)** See course description under Technology, page 245.

52 TECHNOLOGY AND THE ENVIRONMENT (3-0) See course description under Technology, page 245.

Chemistry

7 EARTH, AIR, FIRE AND WATER (3-3) See course description under Chemistry, page 148.

V Forestry

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professors Christensen (Chairman), and Wilm; Associate Professors Hannah, McCormack, and Whitmore; Assistant Professors Armstrong, Donnelly, Hoekstra, Lindsay, Myers; Lecturer Turner; Adjunct Professor Foulds; Adjunct Assistant Professors Fuller, and Harold.

1 INTRODUCTION TO FORESTRY Introduction to forestry and conservation sciences. Two hours. Mr. Donnelly.

2 FRESHMAN SEMINAR Guest lecturers and student seminars on selected topics in forest resources management. One hour. Mr. Donnelly.

5 DENDROLOGY (3-4) Classification and silvical characteristics of native and exotic forest trees. Twig identification. *Prerequisite:* biology 1 or botany 4. Four hours. Mr. Hannah.

100 FOREST BIOECOLOGY Structure, dynamics, and manipulation of selected forest communities. *Prerequisite:* forestry 5. Four weeks in summer camp. Four hours. Mr. Donnelly, Mr. Fuller, and Mr. McCormack.

105 MAN AND THE FOREST ENVIRONMENT (3-0) Forest resources of North America, their uses and their influences on the environment. Three hours. Mr. McCormack.

107 FOREST ENTOMOLOGY (See P & SS 107.) Three hours. Mr. Parker.

112 FOREST PATHOLOGY (See Botany 112.) Three hours. Mr. Wilson.

122 SILVICS Environmental factors and their influence upon the development, distribution, and succession of forest trees. *Prerequisite:* 5. Three hours. Mr. Donnelly.

123 SILVICULTURE (2-3) The principles and practices for governing growth and reproduction of forest stands. *Prerequisite:* 122. Three hours. Mr. McCormack.

132 FOREST FIRE CONTROL Forest fire ecology and behavior; causes and effects; danger measurements; prevention and control of fires; use of fire in forest management. *Prerequisite:* junior standing. Two hours. Mr. Whitmore.

134 INTRODUCTION TO OUTDOOR RECREATION (3-0) Current outdoor recreation resource problems, policies, and needs at national and state levels. Three hours. Mr. Lindsay.

135 FOREST RECREATION PLANNING (2-3) Outdoor recreation site analysis, design, and development in the forest environment; forest recreation area

management. *Prerequisite:* junior or senior standing and permission. Three hours. Mr. Lindsay.

136 FOREST MANAGEMENT (2-2) Organization of forests for continued multiple-use production, regulation of cut for sustained yields. *Prerequisite:* 123 and 144. Three hours. Mr. Armstrong.

140 FOREST BIOMETRY II Boundary and topographic survey methods in forest management. Principles of forest biometry in forest-data collection. *Prerequisite:* C.E. 12, forestry 5, and forestry 144. Four weeks in summer camp. Four hours. Mr. Armstrong and Mr. Myers.

142 FOREST PHOTOGRAMMETRY (2-3) Identification, interpretation, measurement, and mapping of forest resources from aerial photographs. *Prerequisite:* 144. Three hours. Mr. Lindsay.

144 FOREST BIOMETRY I (2-4) Introductory concepts in forest biometry, measurement of trees and forest products, forest sampling and inventory with applications in multiple-use management. *Prerequisite:* Mathematics 110 or concurrent enrollment. Three hours. Mr. Myers.

151 FOREST ECONOMICS The economic principles and problems in the management and utilization of forest resources; taxation of forest lands; marketing of forest products. *Prerequisite:* economics 12. Three hours. Mr. Armstrong.

153 FOREST POLICY AND ADMINISTRATION Analysis of public and private forest policies and their administration in relation to other natural resources and to the people. *Prerequisite:* Junior standing in forestry. Three hours. Mr. Wilm.

162 WOOD TECHNOLOGY (2-3) Properties, uses and identification of commercial woods of the United States. *Prerequisite:* Biology 1. Three hours. Mr. Whitmore.

163 TIMBER HARVESTING (2-3) Methods and costs of harvesting timber under different forest conditions and silvicultural treatments; organization and costs of logging operations. *Prerequisite:* 5. Three hours. Mr. Harold.

165 FOREST PRODUCTS (2-3) Wood products manufacture and distribution including lumber, veneer and plywood, pulp and paper. Wood preservation; naval stores; maple products. *Prerequisite:* 162. Three hours. Mr. Whitmore.

170 WILDLIFE BIOMETRICS Instrumentation, specimen collection-preservation, sexing, aging, food habit analysis, capturing and marking wildlife; habitat analysis and evaluation; wildlife census. Required of wildlife management majors in four week summer term of the junior year. *Prerequisite:* Forestry 174 and 144. Four hours. Mr. Hoekstra.

174 PRINCIPLES OF WILDLIFE MANAGEMENT (2-2) Properties of game populations and their habitat in relation to the mechanisms and practices of game management. *Prerequisite:* biology 2. Three hours. Mr. Fuller.

175 GAME MAMMALS (3-3) Behavioral, ecological, physical, and taxonomic characteristics of the class Mammalia emphasizing game species of North America. *Prerequisite:* Biology 1, 2 and permission. Four hours. Mr. Hoekstra.

197, 198 SENIOR RESEARCH Work on a research problem under the direction of a staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* senior standing and permission. Three hours. Staff.

205 MINERAL NUTRITION OF PLANTS (See plant and soil science 205.) Three hours. Mr. Bartlett and botany and forestry staff. Alternate years, 1971-72.

207 WATER RELATIONS OF PLANTS Absorption, translocation, and transpiration of water. Soil-water relations. Effects of excesses and deficits of water. Mineral absorption. *Prerequisite:* permission. Three hours. Mr. Donnelly and botany and plant and soil science staff. Alternate years, 1972-73.

221 SITE RELATIONS AND PRODUCTION DYNAMICS IN FORESTS (2-4) Theory of site relations; total site concepts; and dynamics of dry matter production. *Prerequisite:* permission. Three hours. Mr. Hannah. Alternate years 1972-73.

222 ADVANCED SILVICULTURE Scientific bases for silvicultural practices for specific forest types. *Prerequisite:* permission. Three hours. Mr. McCormack.

242 ADVANCED FOREST BIOMETRY Advanced principles of electronic data processing and biometry for forest land management. Current developments in the science of forest biometry. *Prerequisite:* 144 or permission. Three hours. Mr. Myers.

252 FOREST VALUATION Principles of valuation of forest growing stock, land and other forest resources. *Prerequisite:* 151 and 136 or concurrent enrollment. Two hours. Mr. Armstrong.

253 FOREST MANAGEMENT DECISION THEORY (3-0) Operations research procedures in forest management including wildlife, fire control, insect control, construction projects, and management of conservation programs. *Prerequisite:* Calculus. Three hours. Mr. Armstrong.

271 WILDLIFE MANAGEMENT (3-3) Integration of principles and techniques of wildlife management with contemporary land use; emphasis on development and maintenance of habitat requirements; population regulation. Field trips. *Prerequisites:* Forestry 123, 170. Four hours. Mr. Fuller and Mr. Hoekstra.

282 FORESTRY SEMINAR Review and discussion of current problems and controversies in natural-resource management. Required of forestry and wildlife seniors and graduate students. One hour. Mr. Wilm.

Geography

COLLEGE OF ARTS AND SCIENCES

Professor Miles (Chairman); Associate Professors Barnum, Gade, Meeks; Assistant Professors, Leinbach, Lind, Wilvert; Instructor Grant.

Note: The normal introductory sequence is 11, 12 although 14, 12 is a recommended alternative, especially for students in economics and business administration.

11 INTRODUCTION TO HUMAN GEOGRAPHY Basic geographic concepts. The cultural diversity among people as it affects the organization and use of the environment. Required of elementary education students. Three hours. I, II. Staff.

12 WORLD NATURAL ENVIRONMENTS The patterns of man's natural

environment with particular attention to land-forms, climate, soil, vegetation and water resources. Three hours. I, II. Staff.

14 INTRODUCTION TO ECONOMIC GEOGRAPHY Elementary spatial models of economic patterns, processes and relationships.

33 WORLD GEOGRAPHY Survey of the major regions and nations of the world. Not open to students who have taken Geography 11, 12. Three hours. I, II. Staff.

51 CLIMATOLOGY Elements of weather and climate, and their interaction with one another to produce world climate patterns. Daily weather analysis to facilitate understanding of various climatic systems. *Prerequisite:* sophomore standing. Three hours. Mr. Lind.

61 AN INTRODUCTION TO REMOTE SENSING AND AIR PHOTO INTERPRETATION Recognition and interpretation of natural and cultural landscapes patterns from aerial photographs leading to analysis of interrelationships in the environment. Survey of remote sensor outputs for environmental studies. Three hours. Mr. Lind.

71 CARTOGRAPHY Introduction to maps and map preparation, principles of map construction, kinds of information suitable for map presentation, techniques of map drawing, methods of map reproduction, graphs and frequency distributions. *Prerequisite:* sophomore standing. Three hours. I, II. Mr. Barnum, Sister Grant.

101-110 REGIONAL COURSES The character and development of the contemporary cultural, economic, and political patterns of the area against the background of its physical and resource base. *Prerequisite:* six hours in the social sciences and sophomore standing.

101 GEOGRAPHY OF AFRICA Mr. Miles.

102 GEOGRAPHY OF CANADA Mr. Miles.

103 GEOGRAPHY OF USSR Mr. Meeks.

105 GEOGRAPHY OF EUROPE Mr. Barnum.

106 GEOGRAPHY OF LATIN AMERICA Mr. Gade.

107 GEOGRAPHY OF THE UNITED STATES Mr. Meeks.

108 GEOGRAPHY OF EAST ASIA Staff.

109 GEOGRAPHY OF SOUTH ASIA Staff.

110 AUSTRALIA-NEW ZEALAND-OCEANIA

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

201 HISTORICAL GEOGRAPHY OF THE UNITED STATES (Same as history 201) The physical setting of the American historical development, emphasizing the sequence of peoples and cultures which have occupied the land and their varied appreciation of its resource base. *Prerequisite:* a course in U.S. History plus six additional hours in geography, history, or other social sciences. Three hours. Mr. Miles.

202, 203 HISTORICAL GEOGRAPHY OF EUROPE (Geography 202 same as History

202) European geography within a framework of past times, the historical development and distribution of settlement, economic and political patterns. *Prerequisite:* 11 or 12 plus six additional hours in geography or history. Three hours. Mr. Barnum.

211 GEOGRAPHIC ANALYSIS OF VERMONT A course emphasizing field studies, using the state and local area as an outdoor laboratory to indicate lines of geographic inquiry and to demonstrate methods and techniques of investigation into the human use of the earth. *Prerequisite:* junior standing and six hours in geography. Three hours. Staff.

216 BIOGEOGRAPHY Processes and patterns of distribution, domestication and human utility of plant and animal species and communities in varying environmental and historical contexts. *Prerequisite:* nine hours in geography or biology. Three hours. Mr. Gade.

221through 223 SPECIAL TOPICS IN REGIONAL GEOGRAPHY Specialized study of a particular region or parts thereof. *Prerequisite:* twelve hours in the social sciences including three in geography, senior standing and departmental permission. Three hours. Staff.

231 PHYSICAL AND RESOURCE GEOGRAPHY OF THE UNITED STATES Identification and analysis of the natural regions of the U.S. as they reflect the elements of the physical environment. Emphasis on distributional patterns and resource significance. *Prerequisite:* six hours in geography including Geography 12. Three hours. Mr. Meeks.

241 ADVANCED PHYSICAL GEOGRAPHY Analysis of the patterns of distribution and the characteristics of the earth's physical landscapes within the context of climatic zonality. Survey of changing climatic and physical patterns during prehistoric times. *Prerequisite:* Geography 12 or 51. Three hours. Mr. Lind.

243 SPATIAL ANALYSIS The analysis of spatial structure and interaction in geography through quantitative and statistical models. An introduction to measurement, scaling, sampling, classification and geographic covariation within a spatial framework. *Prerequisite:* 6 hours in geography (preferably including Geography 14). Three hours. Mr. Leinbach.

244 ADVANCED ECONOMIC GEOGRAPHY Locational analysis of economic activity, transportation and spatial interaction. Three hours. Mr. Leinbach.

246 URBAN GEOGRAPHY An analysis of the morphology and function of cities. Consideration of urban growth and development, methods of classification, distribution, and theories of location. *Prerequisite:* Geography 11 and six additional hours in the social sciences. Three hours. Mr. Barnum.

251 ADVANCED CLIMATOLOGY Analysis of regional and local climatic data with special reference to climatic controls: special laboratory projects. *Prerequisite:* Geography 51 or Meteorology 61 and permission. Three hours. Mr. Lind.

257 POLITICAL GEOGRAPHY (Same as political science 257) The political unit as a geographic area. Location, resources, and the distributional relationships of the variety of cultural and human factors as they have a bearing on the structure and functioning of the modern political unit. Relationship between geopolitics and political geography. *Prerequisite:* twelve hours in geography and political science. Three hours. Mr. Miles.

258 SELECTED TOPICS IN POLITICAL GEOGRAPHY Advanced studies in

political geography focusing primarily on contemporary world politics from a geographical and geopolitical viewpoint. *Prerequisite:* Geography/Political Science 257 and permission. Three hours. II. Mr. Miles.

262 CULTURAL GEOGRAPHY (Same as Anthropology 262) Concepts and theories of cultural ecology, culture area, culture history and the cultural landscape. *Prerequisites:* Geography 11 and six additional hours in geography, anthropology or other social sciences. Three hours. Mr. Gade.

263 MAN IN NATURE An inquiry into the changing conceptions of the earth as the home of man, and the conservative and destructive uses of the physical environment that have resulted from these attitudes. *Prerequisite:* Three hours of geography and senior standing. Three hours. II. Mr. Gade.

271 ADVANCED CARTOGRAPHY The history and importance of cartography; contemporary developments; special laboratory projects. *Prerequisite:* Geography 71 and permission. Three hours. I, II. Mr. Barnum.

281 THE NATURE OF GEOGRAPHY The history, philosophy and structure of modern geography. *Prerequisite:* twelve hours in geography. Three hours. I. Staff.

Geology

COLLEGE OF ARTS AND SCIENCES

Associate Professors Hunt and Stanley (Chairman), Wagner; Assistant Professors Bucke, Doolan, and Drake; Adjunct Professor Johnson.

1 INTRODUCTORY GEOLOGY (3-2) Processes, agents, and their effects on materials, structure, and morphology of Earth's crust. Laboratory includes field trips, study and interpretation of rocks, minerals, and maps. Four hours. Mr. Bucke.

11 INTRODUCTORY MINERALOGY (2-6) Study of the chemical and physical properties of minerals with special regard to their mode of origin. Laboratory stresses identification of minerals in hand specimen. *Prerequisite:* 1, 42, or introductory courses in physics, or chemistry. Four hours. Mr. Drake.

25 ELEMENTARY FIELD GEOLOGY (1-9) Introduction to problem oriented geologic mapping with emphasis on such environmental problems as water storage, mineral resources, land usage, and geologic hazards. *Prerequisite:* None. Four hours. Staff.

32 HISTORY OF THE EARTH (3-0) Origin of the earth and solar system; evolution of the earth's continents, oceans, and atmosphere; the effects of changing ancient environments. Three hours. Mr. Bucke, Mr. Hunt.

42 GEOLOGICAL OCEANOGRAPHY (3-0) Characteristics and development of oceans, their basins and shorelines. Continental drift and related investigations. *Prerequisite:* 1 or introductory science course. Three hours. Mr. Bucke.

101 ENVIRONMENTAL GEOLOGY (3-0) Environmental topics to include water resources, waste disposal, pollution, land planning and development, highways, rivers, and shorelines. *Prerequisite:* 1 or introductory courses in science, engineering, or permission of the instructor. Three hours. Mr. Wagner.

102 GEOLOGICAL EVALUATION OF ENVIRONMENTAL PROBLEMS (3-0) Discussion of the mechanical, structural, and chemical aspects of rocks as they apply to man's use of the earth. Emphasis on technical evaluation of earthquake hazards, mineral, petroleum, and groundwater resources, highway and dam construction, land development, etc. *Prerequisite:* 1 or introductory courses in science, engineering, or permission of the instructor. Three hours. Mr. Stanley.

110 EXTRATERRESTRIAL GEOLOGY (3-0) The geology of extraterrestrial bodies, with emphasis on lunar materials and meteorites. *Prerequisite:* 1. Three hours. Mr. Drake.

121 GEOLOGIC HISTORY OF LIFE (3-0) Survey of the origin, preservation, and diversification of ancient life. The interaction of organisms with their environment and the effect that organisms have had on the evolution of the earth. *Prerequisite:* 1 or Biology 1, or equivalent. Three hours. Mr. Hunt.

130 GEOLOGY OF MINERAL RESOURCES (2-3) The origins, forms, and classifications of mineral deposits. The world location, occurrence and production of major mineral products. *Prerequisite:* 1. Three hours. Staff.

145 OPTICAL MINERALOGY (1-6) The study of the optical properties of minerals by means of the polarizing microscope with emphasis on determinative techniques. *Prerequisite:* 11 (may be taken concurrently). Three hours. Mr. Doolan.

155 SEDIMENTARY PETROLOGY (1-6) Origin, identification, and basis for classification of sedimentary rocks, with emphasis on interpretation of depositional and post-depositional environments. *Prerequisite:* 11. Three hours. Mr. Hunt, Mr. Bucke.

156 IGNEOUS AND METAMORPHIC PETROLOGY (2-3) The origin and analysis of igneous and metamorphic rocks. Laboratory stresses modern approaches to petrologic problems. *Prerequisite:* 145. Four hours. Mr. Doolan.

161 INTRODUCTORY METEOROLOGY (see p. 186).

166 STRUCTURAL GEOLOGY (2-3) Rock deformation, description and geometry of structural types, and the kinematic and dynamic interpretation of structural features of all sizes. *Prerequisite:* 1, 42, 101, or 102. Four hours. Mr. Stanley.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 RESEARCH IN GEOLOGY (0-2) Supervised research and readings in a selected field of geology. Students from the allied sciences, mathematics, and engineering may elect a research problem that combines their major field of study and geology. *Prerequisite:* consultation with the staff. Three hours.

212 ADVANCED MINERALOGY (2-3) Crystallographic, chemical, and physical properties of the common rock forming minerals. Laboratory stresses techniques involved in mineral identification and the analysis of mineral assemblages. *Prerequisite:* 11. Three hours. Mr. Drake.

216 GLACIAL GEOLOGY (2-3) The Quaternary history of North America with emphasis on the origin, mechanics, and effects of past and present glaciations. *Prerequisite:* junior standing or above. Three hours. Mr. Wagner. Alternate years, 1972-73.

218 **HYDROGEOLOGY (3-0)** The origin, occurrence, movement, and character of ground water. *Prerequisite:* junior standing or above. Three hours. Mr. Wagner. Alternate years, 1972-73.

220 **SEMINAR IN ENVIRONMENTAL GEOLOGY (2-3)** Consideration of environmental problems in Vermont, New England, and elsewhere with emphasis on the geological role in the solution of these problems. *Prerequisite:* 101, or by permission of the instructor. Three hours. Mr. Wagner.

222 **INVERTEBRATE PALEONTOLOGY (2-3)** Classification, geological distribution, evolution, paleoecology and morphology of major invertebrate fossil groups. *Prerequisite:* 121, or equivalent. Three hours. Mr. Hunt.

223 **ENVIRONMENTAL GEOLOGY ACTION STUDIES** Study of environmental problems. Emphasis is given to project selection, investigation methods, actual investigation, and constructive implementation of findings for maximum social benefit. *Prerequisite:* permission of the instructor. Three hours. Mr. Wagner.

224 **STRATIGRAPHY (2-2)** Study and interpretation of development and distribution of sedimentary rocks. *Prerequisite:* 155. Three hours. Mr. Bucke.

235 **ADVANCED STRUCTURAL GEOLOGY (2-3)** Dynamic and kinematic origin of earth structures with emphasis on field studies, rock mechanics and other laboratory experiments. *Prerequisite:* 166. Three hours. Mr. Stanley.

237 **STRUCTURAL PETROLOGY (3-0)** Origin of strain features in common rock forming minerals with emphasis on their dynamic and kinematic interpretation as based on laboratory and field studies. Laboratory includes orientation and universal stage procedures, use of computers in the rotation of data, and methods of interpretation. *Prerequisite:* 166 and 145. Three hours. Mr. Stanley.

238 **FIELD GEOLOGY (1-6)** Methods of analysis of field data, structural features in sedimentary, metamorphic, and igneous rocks, and stratigraphic principles. Held in late May and early June. *Prerequisite:* 166 or departmental permission. Four hours. Mr. Stanley.

242 **REGIONAL GEOLOGY (3-0)** Comprehensive study of the geology and sequential development of selected regions of the earth's crust. *Prerequisite:* 156 (or concurrent enrollment), 166, 238. Three hours. Mr. Stanley.

245 **GEOLOGY OF NEW ENGLAND (3-0)** *Prerequisite:* 166, or 156, or 224. Three hours. Mr. Stanley.

253 **PHASE EQUILIBRIUM IN MINERAL ASSEMBLAGES (2-3)** The application of the thermodynamics and graphical methods to the analysis of multicomponent, polyphase systems of mineralogical interest. *Prerequisite:* 212, or 156 desirable, or by permission of the instructor. Three hours. Mr. Drake.

254 **GEOCHEMISTRY (3-0)** The application of basic concepts in chemistry to geological problems, including solution geochemistry, weathering, mineral paragenesis, and the effects of pressure and temperature. *Prerequisite:* 212, or 155, or 156, or by permission of the instructor. Three hours. Mr. Drake.

256 **CRYSTAL CHEMISTRY (2-3)** A discussion of crystal symmetry, polymorphism, order-disorder, cation distribution and chemical variation in mineral systems and the genetic significance thereof. *Prerequisite:* 11 and Chemistry 1-2 or permission of the instructor. Three hours. Mr. Drake.

271, 272, 273, 274 **TOPICS IN GEOLOGY (1-0)** Selected topics of current interest. *Prerequisite:* 156, 166. One hour. Staff.

German

COLLEGE OF ARTS AND SCIENCES

Professor Webster (Chairman); Associate Professors Kahn and Paucker; Assistant Professors Mieder and Richel; Instructor Scrase.

1-2 ELEMENTARY GERMAN Four hours. Staff.

11, 12 INTERMEDIATE GERMAN Literature and Discussion of selected prose with review of grammar. *Prerequisite:* 1-2 or equivalent for 11; 11 for 12. Three hours. Staff.

13, 14 INTERMEDIATE GERMAN Composition and Conversation. Guided conversation, discussion and written work leading to free composition and oral presentations. Grammar review. *Prerequisite:* 13 or 11 for 14. Three hours. Mr. Kahn.

15, 16 INTERMEDIATE GERMAN Introduction to Technical German. Reading technical expository prose of moderate difficulty. Emphasis on developing fluency in reading types of prose useful for graduate work and research in the humanities and sciences. *Prerequisite:* 1-2 or equivalent; 15 for 16. Three hours. Staff.

82 SCIENTIFIC GERMAN *Prerequisite:* 16 or equivalent. Three hours. Staff.

101, 102 INTRODUCTION TO GERMAN LITERATURE Survey of German literature from the beginnings to the twentieth century. *Prerequisite:* 12 or 14 or equivalent. Three hours. Mr. Webster.

121, 122 COMPOSITION AND CONVERSATION Emphasis on increasing oral and written command of the language. Free composition, oral reports, and translation into German. *Prerequisite:* 12 or 14 or equivalent and departmental permission. Three hours. Staff.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS Advanced study in accordance with students' needs and interests. *Prerequisite:* 101, 102 or the equivalent and departmental permission. Three hours. Staff.

197, 198 READINGS AND RESEARCH.

205, 206 GOETHE Life and works of the poet through the Italian journey (205). Goethe in the years of his maturity: 1790-1832 (206). *Prerequisite:* 101, 102 or the equivalent. Three hours. Mr. Webster. Alternate years, 1973-74.

207 NINETEENTH-CENTURY PROSE Narrative prose of representative authors such as Mörike, Keller, Ludwig, Meyer, Stifter, Raabe, and the early Thomas Mann. *Prerequisite:* 101, 102 or the equivalent. Three hours. Staff. Alternate years, 1972-73.

208 NINETEENTH-CENTURY DRAMA Works by Kleist, Büchner, Grillparzer, Hebbel, Ludwig, Wagner and the early Hauptmann. *Prerequisite:* 101, 102 or the equivalent. Three hours. Staff. Alternate years, 1972-73.

209, 210 THE TWENTIETH CENTURY Selected works in poetry, prose and drama by Brecht, George, Hauptmann, Hofmannsthal, Kafka, Thomas Mann, Rilke and others. *Prerequisite:* 101, 102 or the equivalent. Three hours. Staff. Alternate years, 1973-74.

221, 222 **ADVANCED COMPOSITION AND CONVERSATION** Oral and written practice in German of advanced difficulty with emphasis on stylistics. *Prerequisite:* 121, 122 or equivalent. Three hours. Mr. Kahn.

232 **HISTORY OF THE GERMAN LANGUAGE** Historical linguistic development of the German language from earliest times to the present. No knowledge of the older stages of the language is presupposed or required. *Prerequisite:* 121, 122 or equivalent. Three hours. Mr. Mieder. Alternate years, 1973-74.

235 **THE STRUCTURE OF GERMAN** Linguistic analysis of the phonological, morphological, and syntactic structure of modern German with special attention to problems useful for teachers. *Prerequisite:* 121, 122 or the equivalent. Three hours. Staff.

281, 282 **SENIOR SEMINAR** Readings and research. Required of all senior concentrators. One hour.

Hebrew

COLLEGE OF ARTS AND SCIENCES

Associate Professor Kahn

1-2 **ELEMENTARY HEBREW** The spoken language of everyday use with oral, aural and written practice in speaking, reading, and comprehension. Four hours. Mr. Kahn. Alternate years, 1971-72.

11, 12 **INTERMEDIATE HEBREW** Reading, translation, and discussion in Hebrew of texts selected to show the development of Hebrew culture from Biblical times to the present. Three hours. Mr. Kahn. Alternate years. 1972-73.

History

COLLEGE OF ARTS AND SCIENCES

Professors Bliss, Daniels, Davison, Evans (Emeritus), Felt (Chairman, Hand, Rollins, Schmokel, and Schultz; Associate Professors Metcalfe, Muller, Spinner, and Stout; Assistant Professors Andrea, Fackler, Hutton, Overfield, Seybolt, Steffens, Stoler, and True; Instructors Carlson and Young.

Courses numbered 100 to 199 generally require sophomore standing, but may be open to freshmen by permission of the instructor. Courses numbered 200 to 299 require six hours of appropriate work in history.

1, 2 **CONTEMPORARY PROBLEMS IN HISTORICAL PERSPECTIVE** An introduction to historical thinking and literature focusing upon significant historical antecedents of such selected facets of contemporary civilization as urbanization, race, bureaucracy, revolution, science and technology. Three hours. Staff.

3 THE STUDY OF HISTORY An introduction to the methods of studying the past. Use of the works of major historians as a means of investigating the ways in which historians think about and write history. Three hours. Staff (I, II).

9 ANCIENT MEDITERRANEAN CIVILIZATION A detailed study of Athens in the 5th century B.C. continuing to the rise of Rome through the 1st century A.D. (Students who have already taken History 106 may not take History 9). Three hours. Mr. Bliss.

10 MEDIEVAL EUROPEAN CIVILIZATION Three hours. Mr. Andrea.

11 EUROPEAN CIVILIZATION TO 1815 An introduction to the political, social, and intellectual movements which have shaped the foundations of western civilization: from the Renaissance to the French Revolution. Three hours. Staff.

12 EUROPEAN CIVILIZATION, 1815 to 1945 A survey emphasizing the ideas and institutions which have helped shape western society and culture from the Napoleonic Era to the end of the Second World War. Three hours. Staff.

23, 24 HISTORY OF THE UNITED STATES Three hours. Staff.

51, 52 CONTEMPORARY HISTORY First semester, 1918-1945; second semester, 1945 to the present. Three hours. Mr. Spinner.

61, 62 HISTORY OF SCIENCE A survey of the history of the physical and biological sciences from antiquity to the present. The course will stress science as an intellectual activity, within the contemporary context of philosophy, religion and social organization. Three hours. Mr. Steffens.

73 TRADITIONAL EAST ASIAN CIVILIZATION A survey of Chinese and Japanese culture within a political and economic context from ancient times to the coming of the west in the 19th century. Three hours. Mr. Seybolt.

74 EAST ASIA IN TRANSITION Domestic and foreign affairs in China, Japan and Southeast Asia from 1800 to the present. Three hours. Mr. Seybolt.

104 LATIN AMERICAN HISTORY An introduction to the history of modern Latin America. Three hours. Mr. True.

105 HISTORY OF THE ANCIENT NEAR EAST Survey of the primary civilizations of Egypt and Mesopotamia and the secondary cultures of Anatolia, Syria-Palestine, Assyria, and Iran, with particular emphasis on the archaeological evidence. Three hours. Miss Davison.

106 HISTORY OF GREECE Survey of the history of ancient Greece from prehistoric times (with special emphasis on the Minoan and Mycenaean cultures) to the Hellenistic Age. Three hours. Miss Davison.

107 HISTORY OF ROME Survey of the history of ancient Italy from prehistoric times (with special emphasis on the Italic peoples, the Etruscans, and Greek colonization) to the age of Justinian. Three hours. Miss Davison.

115, 116 AFRICAN HISTORY Survey of the history of Africa south of the Sahara, from earliest times to independence. First semester: to 1880; second semester; 1880 to the present. Three hours. Mr. Schmokel.

123 AMERICAN HISTORY SINCE 1945 Three hours. Mr. Hand.

125 BLACK HISTORY Economic, social, political, and intellectual developments in U. S. history as they have affected and been affected by the Black American; emphasis on the period since 1865. Three hours. Mr. Felt.

140 **BIOGRAPHY** Especially designed as an accelerated course of benefit to seniors in disparate fields of specialization (English, foreign languages, the sciences, mathematics, as well as the social sciences), readings in the history and criticism of biography, the role of the individual in history, and biographies of individuals. Three hours. Mr. Schultz.

153, 154 **ENGLISH HISTORY** Political and social history of England. First semester: Middle Ages and Tudor-Stuart; second semester, 1715 to the present. Three hours. Messrs. Metcalfe and Spinner. To be given in alternate years, beginning, 1971-1972.

181 **U.S. MILITARY HISTORY** The development of the American Military Establishment within the framework of American history from the Colonial era to the present. Three hours. Mr. Stoler.

191 **READINGS FOR DEPARTMENTAL HONORS** For seniors concentrating in history only. (Candidates should consult the chairman of the Department at the time of spring enrollment. Students accepted will do their readings between November and March; official enrollment will be in the spring semester.) *Prerequisite:* an 80 average through the junior year and an 85 average in at least eighteen hours of history; completion of at least six hours of history numbered above 200. Three hours. Staff.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH** An individual instructor may prescribe prerequisites for History 197, 198.

201 **HISTORICAL GEOGRAPHY OF THE U.S.** Three hours. See geography 201.

202 **HISTORICAL GEOGRAPHY OF EUROPE** Three hours. See geography 202.

203 **LATIN AMERICAN HISTORY** The Spanish Empire in America including the Indian heritage, the conquest, economic, social and political trends within the empire, and the struggles for independence. Reading knowledge of Spanish strongly recommended. Three hours. Mr. True. (To be given in alternate years, spring semester.)

205 **HISTORY OF MEXICO SINCE 1810** Reading knowledge of Spanish strongly recommended. Three hours. Mr. True. (To be given in alternate years, spring semester.)

207 **THE EARLY MIDDLE AGES** Western Europe from the late Roman Empire to the death of Otto III (A.D. 1002). Three hours. Mr. Andrea.

208 **THE HIGH MIDDLE AGES** Western Europe, 1000-1300. Three hours. Mr. Andrea.

211 **THE RENAISSANCE** Political, economic, and cultural developments in Europe, c. 1250 to c. 1517, with emphasis on the developments in Italy. Three hours. Mr. Overfield.

212 **THE REFORMATION** Political, economic, and cultural developments in Europe in the sixteenth century, with particular attention to the religious movements, and to the evolution of Northern European humanism. Three hours. Mr. Overfield.

213, 214 **CANADIAN HISTORY** Canadian development from the French exploration and settlement to the present; evolution of self-government and

relations with the United States; historical foundations of the problems of biculturalism. Three hours. Messrs. Metcalfe, Muller, and Young.

215, 216 FRENCH CANADA A history of the French experience in North America from 1608-1867 and 1867-1970. Ability to read in French a decided asset. Three hours. Mr. Young.

221 THE AMERICAN COLONIES Three hours. Messrs. Carlson and Stout.

222 THE AMERICAN REVOLUTION Three hours. Messrs. Carlson and Stout.

226 THE MIDDLE PERIOD OF U. S. HISTORY History of the U. S., 1815-1856. Three hours. Mr. Fackler.

231, 232 FRENCH HISTORY First semester: seventeenth century to 1815; second semester: 1815 to the present. Three hours. Mr. Hutton.

233, 234 GERMAN HISTORY First semester: seventeenth century to 1850; second semester: 1850 to the present. Three hours. Messrs. Overfield and Schmokel.

235, 236 INTELLECTUAL HISTORY OF MODERN EUROPE Emphasis upon ideas in their relation to major political and social movements. First semester: Humanism, the Scientific Revolution, and the Enlightenment (1500-1800); second semester: the Nineteenth Century (1800-1914). Three hours. Messrs. Hutton and Overfield.

240 AMERICAN BIOGRAPHY Investigation and portrayal of personalities; the uses of biography in the study of American history. Subjects selected to represent a variety of vocations and aspects of history. Three hours. Mr. Schultz.

243 SOVIET RUSSIA The USSR from the Revolution of 1917 to the present. Three hours. Mr. Daniels.

244 TSARIST RUSSIA History of Russia from the Middle Ages to the revolutionary period. Three hours. Staff.

253 TUDOR-STUART ENGLAND England from 1485 to 1660, with particular emphasis on the central period from the 1530's to the 1640's (the Henrician reformation to the Revolution). Three hours. Mr. Metcalfe. Offered 1972-1973 and alternate years.

254 VICTORIAN ENGLAND Selected topics in 19th century English history with emphasis on "industry and empire", changing class relationships, and the growth and development of political parties. Three hours. Mr. Spinner. Offered 1972-1973 and alternate years.

257, 258 AMERICAN STATESMEN Thought and practical politics of American statesmen. First semester: 1783-1850; second semester: since 1850. Three hours. Mr. Schultz.

259 THE LINCOLN ERA A history of the United States, 1830-1865, with emphasis on the sectional conflict of the 1850's, the Civil War, and the life of Lincoln. Three hours. Mr. Schultz.

261 VERMONT HISTORY A survey of Vermont History from early times to the present. Three hours. Mr. Muller.

263, 264 SOCIAL HISTORY OF THE U. S. Selected topics in the history of American society, including social movements, rural history, or urban history. Three hours. Mr. Fackler.

265, 266 INTELLECTUAL HISTORY OF THE UNITED STATES Three hours. Mr. Felt.

267, 268 HISTORY OF U. S. FOREIGN RELATIONS First semester: 1763-1893; second semester: 1893-present. Three hours. Mr. Stoler.

271, 272 HISTORY OF MODERN CHINA History of China in modern times, including the Empire, the Western impact, the Revolutions of the 20th century, and the Communist regime. Three hours. Mr. Seybolt.

277 SOVIET POLITICS (Same as Political Science 277) An intensive historical and institutional study of the Soviet government and Communist Party, mainly treating the period since 1953. Application of sociological and biographical analysis and data-processing techniques. Comparative treatment of other Communist systems. *Prerequisites:* 6 hours of appropriate work in history, political science, or economics. Three hours. Mr. Daniels.

278 FOREIGN POLICY OF THE USSR (Same as political science 278).

280 SCIENCE AND CULTURE A study of science as an integral part of the culture of our age with emphasis on the published works of leading scientists, mathematicians and "humanists" of the 20th century. Three hours. Mr. Steffens.

281 SCIENTIFIC REVOLUTIONS AND SOCIETY An evaluation of the relationship between scientific activity and conditions of society during the "Scientific Revolution" of the 17th century, the rapid development of science and technology in the 19th century and the "new science" of the 20th century. Three hours. Mr. Steffens.

289 QUANTITATIVE METHODS IN HISTORICAL RESEARCH Applications of quantitative methods to the selection and analysis of historical source materials; emphasis on political and social data. Use of the University's Computation Center facilities and other data-processing equipment. *Prerequisite:* Math 110 or equivalent work in statistics. Three hours. Mr. Fackler.

Home Economics

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professors Betsinger (Chairman), Brown, Grams, Morse, Williams¹; Associate Professors Caldwell, Knowles, Powell, Webster; Assistant Professors Atwood, J. Emanuel, Jameson, Lepeschkin², Livak, Prior, Shelton, and Whittlesey; Instructors Heller³, Howard³, Lord³, McJulien³, McKay, Osborn, Soule, and F. Emanuel; Adjunct Professor Spaven; Adjunct Assistant Professors Keyser and Wynne; Affiliated Faculty: Assistant Professor Rathbone.

1 HOME ECONOMICS IN THE LAND-GRANT COLLEGE Teaching, research, and extension. Historical development of field, its common core of family and individual, professional opportunities which are available. 1 hour. Staff.

1. On sabbatical leave, 1971-72.
2. On leave of absence, first semester 1971.
3. Part-time, second semester, 1971-72.

Clothing Textiles, and Design

15 **DESIGN (1-4)** Color and design in theory and practice. Work with various media for creative expression and understanding of art principles. Three hours. I, II. Misses Atwood and Caldwell.

16 **SKETCHING for FASHION AND HOUSING DESIGN (1-4)** Sketching the human figure in poses and in action. Orthographic and perspective drawing. Rendering in various media. *Prerequisite:* 15. Three hours. Miss Atwood.

20 **TEXTILES AND CLOTHING FOR THE CONSUMER (3-0)** Clothing: its impact on wearer and observer. Today's fibers, fabrics and finishes. Consumer problems and responsibilities in selection, use, care. Three hours. I, II. Mrs. Emanuel.

22 **CLOTHING CONCEPTS AND TECHNIQUES I (1-4)** Selection of clothing to meet individual needs in relation to design and appropriateness of dress. Development of clothing construction techniques. Three hours. Staff.

23 **CLOTHING CONCEPTS AND TECHNIQUES II (1-4)** The role of fashion and clothing in human behavior. Emphasis on pattern alteration and advanced construction techniques. *Prerequisite:* 22 or instructor approval based on a pretest. Three hours. Mrs. Lawler.

107 **COSTUME DESIGN (1-4)** Application of design fundamentals and principles to fashion planning. Techniques of fashion illustration. *Prerequisites:* 15, 16. Three hours. Miss Caldwell.

115 **TEXTILE DESIGN (1-4)** Application of design elements and principles to processes of textile design. The Shelburne Museum collection will provide resources for research. *Prerequisites:* 15, 20; or Art 10 and departmental permission. Three hours. Miss Atwood.

116 **WEAVING (1-4)** Practical application of design fundamentals in the creation of woven textiles. Shelburne Museum collection available for study. *Prerequisites:* 15, 20; or Art 10 and departmental permission. Three hours. Miss Atwood.

117 **HISTORY OF COSTUME (2-2)** History of costume stressing the background, philosophy and events of each period as reflected in dress. *Prerequisites:* Art 5, 6. Three hours. Miss Caldwell.

119 **INTERIOR DESIGN I (1-4)** Application of design fundamentals to the problems involved in furnishing the home. *Prerequisite:* 15 (and 16 for Design majors). Three hours. Miss Caldwell.

120 **ADVANCED TEXTILES (3-3)** Physical and chemical properties of fibers in relation to fabric characteristics. Technological developments in fabric formation, dyes, finishes. Testing techniques. *Prerequisites:* H.E. 20, Chemistry 16. Four hours. Mrs. Emanuel.

122 **PATTERN DESIGN (2-4)** Techniques of designing and altering flat patterns. Advanced construction techniques, altering flat pattern, and emphasis on original design. *Prerequisite:* 23. Three hours. I, II. Mrs. Webster.

123 **TAILORING (2-4)** Construction techniques with emphasis on tailoring problems. *Prerequisite:* 122. Three hours. Mrs. Webster.

S217 **AMERICAN TEXTILES AND FASHION: TWO CENTURIES—18th Century to 1910.** Study of home production of textiles, needle art and clothing in collections at Shelburne Museum. Lectures, demonstrations and laboratory experience.

Prerequisite: six hours in design and/or textiles, or permission of instructors. Three hours. Misses Atwood and Caldwell.

219 INTERIOR DESIGN II (1-4) Interior design; period furnishing, its present use and influence upon modern furnishing. *Prerequisite:* 119. Three hours. Miss Caldwell.

221 COSTUME DESIGN AND DRAPING (1-4) Draping techniques in creative fashion design. Handling of fabrics in relation to line in dress. Original projects. *Prerequisites:* 15, 122. Three hours. Mrs. Webster.

229 CLOTHING, TEXTILES AND RELATED ART SEMINAR Theory and research in Clothing, Textiles and Related Art, analysis of current problems; review and discussion of recent publications; individual studies. *Prerequisites:* 117, 219 or 221. Three hours. Staff.

231 ADVANCED CLOTHING WORKSHOP AND SEMINAR (2-4) Individual projects using all possible methods of clothing design. Independent laboratory work. Emphasis on management, planning, new techniques, production, evaluation. *Prerequisites:* 123, 221. Three hours. Mrs. Webster (Graduate Credit Pending).

Home Economics Education

15 PARTICIPATION (See Education 15) Credit to be arranged. Staff.

71 INTRODUCTION TO HOME ECONOMICS EDUCATION Careers in home economics education, contemporary programs, professional and youth organizations, and resources. Independent study, field trips, experiences in teaching. *Prerequisite:* sophomore standing. Three hours. Miss Osborn.

171 METHODS OF TEACHING Methods of teaching home economics in junior-senior high schools, and administration of home economics departments in secondary schools. *Prerequisites:* 71; psychology I. Three hours. Miss Brown.

172 STUDENT TEACHING Supervised observation and teaching in approved home economics programs in Vermont schools. *Prerequisite:* 171. Seven hours. Miss Brown and Miss Osborn.

173 COMMUNICATION METHODS (2-2) Presentation of information through the media of press, radio and television, and lecture-demonstration. *Prerequisite:* junior standing. Three hours. I. Miss Osborn and Mr. Spaven.

175 SPECIAL PROBLEMS IN HOME ECONOMICS EDUCATION Individual investigation of a problem selected to meet special needs of students. Students may accumulate up to six hours. *Prerequisite:* 71 and permission of instructors. Two or three hours. Miss Brown and Miss Osborn.

272 TEACHING ADULTS Organization and teaching of classes in home economics to meet the needs of adults; supervised experience in teaching adults. *Prerequisite:* 171, or permission of instructor. Two hours. Miss Brown.

273 OCCUPATIONAL EDUCATION (2-3) Role of the home economics teacher in organizing and implementing wage earning educational units at the secondary school level. *Prerequisite:* 171, or experience in secondary home economics education. Three hours. Miss Osborn.

274 HOME ECONOMICS IN ELEMENTARY AND MIDDLE SCHOOLS Home Economics, an integral part of curriculum, grades one through eight. Observations of children in these grades. Participation in schools. *Prerequisites:* 63, 71. Three hours. Miss Osborn.

Housing and Home Management

51 **FAMILY HOUSING SELECTION** A study of the problems involved in selecting living environments for families including site location, financing, structure and space design. Three hours. Miss Knowles.

52 **SOCIO-ECONOMIC ASPECTS OF HOUSING** The housing needs of families including low income, elderly, physically handicapped and minority groups; programs devised to aid housing problems. Three hours. Miss Knowles.

54 **HOUSEHOLD EQUIPMENT (2-2)** Application of scientific principles to the selection, operation and care of household equipment. Three hours. Miss Knowles.

56 **PRINCIPLES OF HOME MANAGEMENT** Family and individual management techniques. Application to use of time, energy and money. Introduction to consumer economics. Three hours. Mrs. Soule, Mrs. Howard.

151 **HOUSE PLANNING (1-4)** An advanced study of housing design to meet family requirements, application of home management principles. *Prerequisites:* 51, 56. Three hours. Miss Knowles.

155 **EXPERIMENTAL EQUIPMENT (1-4)** Performance measurement and rating of household equipment. *Prerequisite:* 54. Three hours. Miss Knowles.

156 **HOME MANAGEMENT RESIDENCE** Practical application of principles of home management. *Prerequisites:* 56, 137. Three hours. I, II. Miss Knowles, Mrs. Howard and Mrs. Soule.

158 **CONSUMER PROBLEMS** The consumer in the economy: modern buyer/seller relationships; agencies providing consumer information and protection, lecture, readings, demonstration problems. *Prerequisite:* junior or senior standing. Three hours. Mrs. Prior.

251 **ADVANCED HOUSING** Investigation of housing data and current problems including studies of environmental factors, technological developments and governmental programs. *Prerequisites:* 51; economics 12 and sociology 21. Three hours. Miss Knowles.

256 **HOME MANAGEMENT PROBLEMS** Application of economic and sociological principles to some problems of the home and family. *Prerequisites:* 56; economics 12; psychology 1. Three hours. Staff.

258 **FAMILY ECONOMICS** The American family as a socio-economic unit; acquiring resources, managing current consumption, planning for future consumption. *Prerequisites:* 56; economics 3 or 12. Three hours. Staff.

Human Nutrition and Food and Dietetics

37 **BASIC CONCEPTS OF FOODS (2-2)** Basic principles of food purchasing and preparation presented through demonstration, lecture and laboratory participation. I, II. Three hours. Mrs. Soule.

40 **BASIC CONCEPTS OF CONTEMPORARY NUTRITION (3-0)** Basic concepts of nutrition with special emphasis on problem-solving as it relates to contemporary nutrition. Three hours. I, II. Mrs. Livak.

41 **CLINICAL NUTRITION (3-0)** Fundamental nutrition information related to clinical settings in which health personnel may be expected to function on the technical level. Three hours. Mrs. Howard.

43 FUNDAMENTALS OF NUTRITION (see Animal Sciences 43) Three hours. Staff.

135 ADVANCED FOOD PREPARATION (2-4) Scientific principles and processes underlying food preparation and preservation. *Prerequisite:* 37 and a course in organic chemistry or equivalent. Four hours. I, II. Mrs. Livak.

137 MEAL MANAGEMENT (1-5) Principles and practice in planning, preparing and serving family meals. *Prerequisite:* 37 or equivalent. Three hours. I, II. Mrs. Soule.

140 CHILD NUTRITION (3-0) Consideration of nutritional implications in growth and development from conception through adolescence. Physiological and environmental factors which affect nutritional status. *Prerequisite:* sophomore standing. Three hours. Miss Williams.

141 NUTRITION AND HEALTH (3-0) Basic principles of nutrition. Nutrient content of foods. Practice in recording and evaluating dietary intake of individuals. *Prerequisites:* Chemistry 4, Zoology 6. Three hours. Misses Powell and Williams.

144 APPLIED NORMAL NUTRITION (2-2) Emphasizing nutritional needs of individuals during the life cycle. Attention is given to social, economic and cultural factors affecting nutrient intake. *Prerequisite:* a college course in nutrition. Three hours. Miss Powell.

145, 146 DIET MODIFICATION IN DISEASE Modification of the diet in prevention and treatment of disease. Role of diet in nursing care. Integrated with Nursing 21, 22, 121, 122, 176. *Prerequisite:* 141. Four hours. I, II. Miss Powell.

148 COMMUNITY INVOLVEMENT—PROBLEMS IN FOODS AND NUTRITION (3-0) Individual investigation of a specific problem relating to nutritional health of people. Focus on analysis and solutions of the problem. *Prerequisite:* college course in nutrition or departmental permission. Three hours. Mrs. Livak.

S235 RECENT ADVANCES IN FOODS AND NUTRITION Interpretation, application and communication of trends in foods and nutrition as evidenced through literature and research. *Prerequisite:* 12 hours in foods and nutrition and related areas. Three hours. Staff.

236 INTRODUCTION TO FOOD RESEARCH (1-4) Methods and techniques in experimental work in foods. Independent laboratory study of problems in food preparation. *Prerequisite:* 135. Three hours. Mrs. Livak.

237 INTRODUCTION TO FOOD RESEARCH (1-4) Methods and techniques in experimental work in foods. Independent laboratory study of problems in food preparation. *Prerequisite:* 135. Three hours. Mrs. Livak.

238 WORLD DIETARY PROBLEMS (3-0) A background for understanding the causes of undernutrition, the magnitude of the problem, and the programs seeking workable solutions. *Prerequisites:* 135, 144, or departmental permission. Three hours. Miss Williams.

240 METHODS IN NUTRITION EDUCATION (3-0) Problems common to nutrition educators in schools, hospitals, and community. Individual investigations selected to meet special needs. *Prerequisite:* college course in nutrition or departmental permission. Three hours. Staff.

244 DIET THERAPY (4-0) Adaptations of the normal diet in conditions affected by or affecting the utilization of food. *Prerequisites:* 246, biochemistry, physiology. Four hours. Miss Powell.

246 ADVANCED NUTRITION (3-0) A study of nutrients and their specific functions in metabolic processes. *Prerequisites:* a course in physiology and a course in organic or biochemistry, and permission of the instructor. Three hours. Mr. Keyser and Mr. Welch.

248 READINGS IN NUTRITION Critical survey of the literature on recent developments in nutrition. *Prerequisite:* 246, or departmental permission. Two or three hours. Staff.

249 NUTRITION SEMINAR A review of recent developments in nutrition with special emphasis on nutritional problems on a worldwide basis. *Prerequisite:* a college course in principles of nutrition. Three hours. Miss Morse and Mr. Welch.

294 HISTORY OF NUTRITION Foremost investigators and methods involved in the development of present day nutritional knowledge. *Prerequisite:* three hours of nutrition. One hour. Miss Morse.

Institutional Administration

138 QUANTITY FOOD PRODUCTION AND SERVICE (3-4) Application of principles and techniques of food production and service in different establishments including equipment, sanitation, and time-motion studies. *Prerequisite:* 135. Five hours. Mr. Emanuel.

139 INSTITUTIONAL PURCHASING AND FOOD COST CONTROL (3-0) Principles of institutional purchasing, accounting, food cost control, and menu planning. *Prerequisite:* 135. Three hours. Mr. Emanuel.

239 INSTITUTIONAL ORGANIZATION AND MANAGEMENT (3-0) Institutional organization and management; personnel policies; laws and regulations; promotion and advertising. *Prerequisites:* 138, 139, or equivalent. Three hours. Mr. Emanuel.

Early Childhood Programs and Services

82 CREATIVE CURRICULUM ACTIVITIES FOR THE EARLY CHILDHOOD YEARS I (2-2) Planning interdisciplinary program materials for children on an individual and group basis using movement, graphic, plastic, language arts, *Prerequisite:* 63, or equivalent. Three hours. Mrs. Lepeschkin.

182 CREATIVE CURRICULUM ACTIVITIES FOR THE EARLY CHILDHOOD YEARS II (2-2) Planning interdisciplinary program materials for children on an individual and group basis emphasizing mathematics, the natural ecology, and general sciences. *Prerequisites:* 63, 164, or permission of instructor. Three hours. Mrs. Lepeschkin.

184 EARLY CHILDHOOD EDUCATION (3-0) An active examination of present day early childhood programs in relationship to their historical development from early history. Three hours. Mrs. Lepeschkin.

185 EXPERIENCE WITH PRESCHOOL FAMILIES (3-3) Students interact with children, parents and teachers in evaluating the interrelationship of the home and the early childhood program. *Prerequisites:* 63, 164, or permission of instructor. Four hours. Mrs. Lepeschkin.

187 FIELD PRACTICUM Supervised teaching in accredited early childhood facilities licensed or approved by responsible boards. *Prerequisite:* permission of instructor. 7 hours. Mrs. Lepeschkin.

188 ADMINISTRATION SEMINAR FOR EARLY CHILDHOOD PROGRAM Administration and planning for an early childhood development center. *Prerequisites:* 82, 185, junior standing, and an Early Childhood Major. One hour. Staff.

189 EARLY CHILDHOOD PRACTICUM (1-5) Supervised planning and conducting the early childhood laboratory center. *Prerequisite:* 188, or departmental permission. Six hours. Staff.

261 INTERNATIONAL EARLY CHILDHOOD EDUCATION An examination of the practices and interrelated services in the field of early childhood education in several countries. *Prerequisite:* 184, or equivalent. Three hours. Mrs. Lepeschkin.

Human Development

61 HUMAN DEVELOPMENT IN CONTEMPORARY SOCIETY The impact of the family, community, and various agencies and systems within society upon the developing individual. Three hours. Mr. Grams.

62 ADOLESCENT PSYCHOLOGY AND DEVELOPMENT Physical growth, physiological, psychological, and social development in adolescence. Emphasis on interrelationships of these processes and the developing personality. *Prerequisites:* sophomore standing, psychology 1. Three hours. Mr. Shelton.

63 CHILD DEVELOPMENT The biological, psychological, and social growth and development of the child and his relationships with his family, peers and institutions. *Prerequisite:* sophomore standing. Three hours. Mrs. Jameson and Mr. Shelton.

64 MATURING AND AGING Physical change, physiological, psychological, social development during the maturing years and older age. Interrelationships between these processes will be stressed. *Prerequisites:* sophomore standing, psychology 1. Three hours. Mr. Grams.

161 HUMAN RELATIONSHIPS AND SEXUALITY Sexual responsibility and the biological, social, psychological growth and development of human beings in terms of sex role identity. Three hours.

163 THE EMERGING FAMILY Development of parents and children in various stages of the family life cycle and various emerging family forms. *Prerequisite:* junior standing. Three hours. I, II. Mrs. Jameson and Mr. Lord.

164 PARENT-CHILD RELATIONS Interpersonal relations of adults and children and the application of underlying principles in parent education and family consulting. Three hours. Mr. Grams.

169 HUMAN DEVELOPMENT PROGRAM SEMINAR An ongoing seminar for Human Development majors. Readings; study and discussion of current issues, research, publications, and professional affairs. *Prerequisite:* sophomore standing, Human Development Major, or permission of staff. A student may enroll for a maximum of 12 hours. Two hours. Staff.

264 CHANGING ROLES OF MEN AND WOMEN Recent literature regarding the changing roles of men and women and the unique tasks they face in the contemporary world. *Prerequisite:* 163 and/or sociology 151, or equivalent. Three hours. Mr. Shelton.

265 FAMILY LIFE EDUCATION IN SCHOOL AND COMMUNITY Methods,

materials, and philosophy of family life and sex education in the schools. *Prerequisites:* 63, 163, or equivalent. Three hours. Mr. Grams.

266 SEMINAR IN HUMAN DEVELOPMENT An intensive study of issues in human development and their application in a wide variety of professional areas. *Prerequisites:* 63 and 163, or equivalent. Three hours. Mr. Shelton.

Social Welfare Program.

SW-51 HUMAN NEEDS AND SOCIAL SERVICES Study of problems in social functioning and social services to meet such problems. Three hours. Mrs. McKay.

SW-166, 167 SOCIAL WELFARE AS A SOCIAL INSTITUTION Philosophy, purpose, history of social welfare; review of fields and processes of social work. *Prerequisites:* sociology 22, psychology 1. Three hours. Miss Whittlesey.

SW-168 SOCIAL WORK AS A PROFESSION Means of intervention or methods employed by social workers in providing services on individual, group and community levels. *Prerequisites:* SW 166, 167. Three hours. Staff.

SW-169 SOCIAL WORK IN THE COMMUNITY Field experience in community social agencies with study and discussion of social work services. *Prerequisite:* SW 168 and permission of instructor. Four hours. Mrs. McKay.

SW-170 FIELD EXPERIENCE Field experience under supervision will be given in social agencies four and one-half days each week. Weekly seminar. *Prerequisites:* senior standing; SW 51, 166, 167, 168. Fifteen hours. Mrs. McKay and Miss Whittlesey.

SW-291, 292 SPECIAL PROBLEM Supervised study in the field of social welfare. Not for graduate credit. Three hours. Miss Whittlesey.

Seminars and Research

290 INTRODUCTION TO RESEARCH Research procedures with lectures and discussions of problem selection, objectives, bibliographical techniques, and analysis of data. One hour. Miss Morse.

291, 292 SPECIAL PROBLEMS Reading, discussion, and special field and/or laboratory investigations. *Prerequisite:* departmental permission. Maximum of 6 hours in the year. Students may enroll more than once. Not for graduate credit. Staff.

Mathematics¹

COLLEGE OF TECHNOLOGY

Professors Schoonmaker (Chairman), Brock, Izzo, Lighthall, Meserve, Moser and Riggs; Associate Professors Bee, Chamberlain, Dwork, Hill, Prather, Sylwester, Whorton, and Wright; Assistant Professors Burgmeier, Cooke and Lamborn;

1. For many mathematics courses it will be assumed that the enrolled student knows how to program the University computer and how to use the University computer facility. This knowledge can be acquired by attending an informal six hour session arranged by the director of the academic computer facility.

Instructors Brown, Cobb, Dimmock, Earnshaw, Johansson, Morrow, Puterbaugh and Williams.

1 **ELEMENTARY COLLEGE ALGEBRA** Review of fundamental operations and a more extensive study of fractions, exponents, radicals, linear and quadratic equations. Additional topics to be discussed include ratio, proportion, variation, progressions and the binomial theorem. This course covers the topics normally included in intermediate algebra in high school. Students who have satisfactorily completed two years of high school algebra, or the equivalent, will receive no credit for this course. Offered only in Summer Session. Three hours. Staff.

2 **PLANE TRIGONOMETRY** A study of trigonometric functions, their graphs and other properties, logarithms, solution of triangles, trigonometric equations and identities, and inverse trigonometric functions. *Prerequisite:* 1 or 9. Three hours. Staff.

4 **MATHEMATICS OF FINANCE** Mathematical theory of finance applied to interest and investments, annuities, and life insurance. *Prerequisite:* 1 or 9. Three hours. Staff.

7, 8 **FUNDAMENTALS OF MATHEMATICS** To provide an understanding of basic logical and mathematical ideas (both ancient and modern) and some of their applications to other fields of knowledge. Emphasis is on fundamental concepts and logical methods of reasoning rather than on the development of techniques. Many topics of algebra, trigonometry and analytic geometry are considered in their relation to certain basic concepts pervading all mathematics. A course for students in the arts, social sciences and others whose programs do not require further study of mathematics. Credit will not be given for both mathematics 7 and 9. *Prerequisite:* one year each of secondary school algebra and geometry, 7 for 8. Three hours. Staff.

9 **COLLEGE ALGEBRA** A study of sets, relations, and functions with particular attention to properties of algebraic, exponential, and logarithmic functions, their graphs and applications. Students who have earned credit for any higher numbered course in mathematics may not enroll in this course for credit. Credit will not be given for both mathematics 7 and 9. *Prerequisite:* two years of secondary school algebra and one year of secondary school geometry. Three hours. Staff.

11² **PLANE ANALYTIC GEOMETRY AND CALCULUS** A few topics from College Algebra and an introduction to plane analytic geometry and calculus. This course prepares students for mathematics 12. *Prerequisite:* 9 and 2 or sufficiently strong background in secondary school algebra and trigonometry. Five hours. Staff.

12 **ANALYTIC GEOMETRY AND CALCULUS** A continuation of the study of plane analytic geometry, differential and integral calculus and their applications, vectors, and solid analytic geometry. *Prerequisite:* 11. Five hours. Staff.

13¹ **ENGINEERING MATHEMATICS I** Some plane analytic geometry and calculus of algebraic functions with applications. This course is intended primarily for engineering students. *Prerequisite:* 9 and 2 or sufficiently strong background in secondary school algebra and trigonometry. Four hours. Staff.

2. Those who are deficient in high school mathematics for their chosen curriculum are urged to attend summer school prior to their first semester in college.
1. Those who are deficient in high school mathematics for their chosen curriculum are urged to attend summer school prior to their first semester in college.

14 **ENGINEERING MATHEMATICS II** A continuation of mathematics 13 including transcendental functions, techniques of integration, applications of the calculus and solid analytic geometry. *Prerequisite:* 13. Four hours. Staff.

25, 26 **FUNDAMENTALS OF CALCULUS I, II** Differential and integral calculus with analytic geometry, and an introduction to linear algebra are presented with applications from both social and physical sciences. Not accepted as prerequisite to advanced mathematics courses. A student who completes Mathematics 26 may be admitted to Mathematics 12 upon the recommendation of his Mathematics 26 instructor. Students interested in intensive use of mathematics should take Mathematics 11 and 12. *Prerequisite:* 9 and 2 or sufficiently strong background in secondary school algebra and trigonometry; 25 for 26. Three hours. Staff.

31 **INTRODUCTION TO COMPUTER SCIENCE** Structure of a digital computer. Introduction to flow charting and machine oriented languages. Programming and coding in a commonly used language. Practical experience with the solution of various types of problems on a university computer (presently system 360/44). *Prerequisite:* 9 or the equivalent. Two hours. Staff.

102 **FUNDAMENTAL CONCEPTS OF MATHEMATICAL ANALYSIS** Sets, relations, functions, the Schroeder-Bernstein theorem, cardinal numbers, ordinal numbers, well-ordering, the Axiom of Choice, Zorn's lemma, rational numbers, fundamental sequences, real numbers, complex numbers, elementary topology of the reals and complexes. *Prerequisite:* credit or concurrent enrollment in mathematics 121. Three hours. Staff.

110 **ELEMENTARY STATISTICS** Frequency distributions, measures of central tendency, measures of variation, probability, expectation, binomial and normal distributions, sampling, estimation, tests of hypotheses, regression and correlation. Not open to mathematics majors. *Prerequisite:* 9 or the equivalent. Three hours. Staff.

115 **INTRODUCTION TO COMPUTING I** Algorithms, programs and computers. Basic programming and program structure. Computer solution of numerical and non-numerical problems using one or more programming languages. *Prerequisite:* 9 or the equivalent. Three hours. Staff.

116 **INTRODUCTION TO COMPUTING II** Computer structure, machine language, instruction execution, addressing techniques and digital representation of data. Symbolic coding and assembling systems, macros, linkage. Systems and utility programs. *Prerequisite:* 115. Three hours. Staff.

121 **SOPHOMORE MATHEMATICS** Partial differentiation, multiple integrals, infinite series, and elementary differential equations. *Prerequisite:* 12. Three hours. Staff.

123 **ENGINEERING MATHEMATICS III** A continuation of mathematics 14 including vectors, partial derivatives, multiple integrals, infinite series, complex numbers and elementary differential equations. *Prerequisite:* 14. Four hours. Staff.

124 **LINEAR ALGEBRA** A study of matrices, linear dependence, vector spaces, linear transformations and characteristic equations. *Prerequisite:* 12. Three hours. Staff.

125, 126 **FUNDAMENTAL CONCEPTS OF ELEMENTARY SCHOOL MATHEMATICS** Discussion of natural numbers, integers, fractions, decimals, and real numbers together with the fundamental operations and fundamental

principles involving them. Number bases, sets, measurement and approximation, ratio, proportion, percentage, and selected topics from algebra which are a natural extension of arithmetic. Open only to students in elementary education. *Prerequisite*: sophomore standing; 125 for 126. Three hours. Staff.

179 **TEACHING SECONDARY SCHOOL MATHEMATICS** Contemporary secondary school mathematics curricula, their content from an advanced standpoint, unifying mathematical concepts and their implications at various levels, and the introduction of selected mathematical topics. Intended only for students with an interest in teaching secondary school mathematics. Not acceptable as part of any mathematics requirement for a degree. *Prerequisite*: Ed. 178, acceptance in teacher education, or permission of instructor. Three hours. Mr. Meserve.

200 **STATISTICAL METHODOLOGY I** Fundamental ideas and techniques of statistics, including randomization, confidence intervals, hypothesis testing, and estimation. Emphasis on applications to current problems of interest to the student requires acquaintance with another discipline to serve as source of data for problems (e.g., education, biology, economics, psychology, agricultural and civil engineering). No graduate credit for mathematics majors. This course is much more demanding than 110. *Prerequisite*: 9. Three hours. Staff.

201 **STATISTICAL METHODOLOGY II** Techniques of regression, analysis of variance and covariance, multiple comparisons. Heavy emphasis on application requires knowledge of another discipline to serve as source of current problems and data. *Prerequisites*: 200 or 204. Three hours. Staff.

202 **SAMPLING METHODS** Constructing and analyzing designs for investigations involving sampling techniques. Descriptive surveys including simple random, stratified, and multistage designs. Estimation in finite populations including ratio and regression estimators. *Prerequisite*: 201. Three hours. Mr. Whorton.

203 **ELEMENTS OF PROBABILITY** Basic concepts, techniques and applications of probability, random variables, moment generating functions, laws of large numbers and central limit theorems. Techniques and applications include permutations and combinations, binomial and normal distributions, the Poisson process, reliability theory and quality control. No graduate credit for mathematics or electrical engineering majors. *Prerequisite*: 12. Three hours. Staff.

204 **MATHEMATICAL STATISTICS I** Theory and application of classical statistical methods. Sampling distributions, estimation procedures, tests of hypothesis and confidence intervals. *Prerequisite*: 102, 124, 203. Three hours. Miss Lamborn.

205 **MATHEMATICAL STATISTICS II** Theory and application of modern statistical procedures. Non-parametric methods, multivariate techniques, decision theory, sequential procedures. *Prerequisite*: 204. Three hours. Miss Lamborn.

206 **EXPERIMENTAL DESIGNS** Analysis of variance including subsamples and disproportionate subclass numbers, estimation of variance components, incomplete block designs, compounding of factorial effects, fractional replication, multiple comparison techniques, principles of split plots, and pooling of experiments. *Prerequisite*: 201. Three hours. Mr. Bee and Mr. Whorton.

207 **PROBABILITY THEORY** Basic non-measure-theoretic course in probability theory with some applications. Axioms of probability, random variables, moment

generating functions, laws of large numbers and central limit theorems, introduction to stochastic processes. Students will need a strong working knowledge of calculus including infinite series, partial differentiation and multiple integration. *Prerequisites:* 102, 124. Three hours. Mr. Sylwester.

210 **APPLIED STOCHASTIC PROCESSES** Random walk models, Markov chains, Poisson process, Brownian motion, probability generating functions, discrete branching processes, homogeneous birth and death processes, and diffusion processes. *Prerequisites:* 207. Three hours. Mr. Sylwester.

211 **MULTIVARIATE METHODS** Multivariate normal theory, tests of hypotheses. Multivariate analysis of variance and covariance, principle components and factor analysis. *Prerequisites:* 201 and 205, or permission of instructor. Three hours. Mr. Whorton.

216 **SYSTEMS PROGRAMMING** Review of assembly language coding. Batch processing systems programs. IOCS buffer pool management, supervisors, loaders, utilities. Parallel processors, Interrupt handling, spooling. Introduction to multi-programming and time sharing. *Prerequisite:* 116 or equivalent. Three hours. Staff.

217 **SWITCHING THEORY** Lattices and Boolean algebras, Boolean functions, minimization theory, Quine's algorithm, combinational and sequential logic nets, state assignment problems, Hartmanis' theorems, closure operators, Paull-Unger problems. *Prerequisite:* 251 or permission of instructor. Three hours. Mr. Hill.

218 **AUTOMATA THEORY** Finite state automata, nondeterministic and two-way automata, theorems of Rabin-Scott, Myhill and Kleene. Regular expressions, homomorphisms, the lattice of automata, free automata, isomorphism theorems. *Prerequisite:* 251. Three hours. Mr. Prather.

219, 220 **MATHEMATICAL LOGIC** Truth tables, axiomatic propositional calculus, independence, first order quantification theory, completeness theorems, prenex normal forms, decidability. Formal number theory, recursive functions, Gödel numbers, recursive undecidability, axiomatic set theory, ordinal numbers, the axiom of choice, effective computability, undecidable problems. *Prerequisites:* 102 or consent of instructor; 219 for 220. Three hours. Mr. Prather.

221 **DETERMINISTIC MODELS IN OPERATIONS RESEARCH** Techniques of linear and dynamic programming and game theory. Graphs and tree models. Classical problems are discussed, and problem formulation stressed. *Prerequisites:* 121, 124. Three hours. Mr. Prather.

222 **STOCHASTIC MODELS IN OPERATIONS RESEARCH** Stochastic processes and their use in analysis of industrial problems. Markov chains, queueing theory, linear and dynamic programming under uncertainty. *Prerequisites:* 203, or 207; 221. Three hours. Mr. Sylwester.

229 **COMPUTER FACILITY MANAGEMENT** Non-mathematical content, problems of technical administration, budget considerations, open-closed shop, equipment proliferation, interorganizational relationships. *Prerequisites:* 116 or permission of instructor. Two hours. Mr. Brock and Mr. Hill.

230 **ORDINARY DIFFERENTIAL EQUATIONS** Solutions of linear ordinary differential equations, the Laplace transformation, and series solutions of differential equations. *Prerequisites:* 121, 124. Three hours. Staff.

231, 232 **FUNCTION OF A COMPLEX VARIABLE** Differentiation and integration of

a function of a complex variable, mapping of elementary functions, infinite series, properties of analytic functions, analytical continuation, calculus of residues, contour integration, integral functions, meromorphic functions, Riemann surfaces, and conformal representation. *Prerequisite:* 242; 231 for 232. Three hours. Staff.

233, 234 **THEORY OF FUNCTIONS OF REAL VARIABLES** Functions of real variables, including: point sets and measure, transfinite numbers, Riemann and Lebesgue integrals, and sequences of functions. Considerable outside reading is assigned. *Prerequisite:* 242; 233 for 234. Three hours. Staff.

235 **PARTIAL DIFFERENTIAL EQUATIONS** First order equations, classification of second order equations, standard problems of Laplace and Cauchy. *Prerequisites:* 230; 242. Three hours. Staff.

236 **CALCULUS OF VARIATIONS** Necessary conditions of Euler, Legendre, Weierstrass and Jacoby for minimizing integrals. Sufficiency proofs. Variation and eigenvalue problems. Hamilton-Jacoby equations. *Prerequisite:* 230. Three hours. Staff.

237 **NUMERICAL METHODS I** Concept of error, polynomial approximation, summation techniques, solution of equations, linear systems, eigenvalues. *Prerequisites:* 121 and 124. Three hours. Staff.

238 **NUMERICAL METHODS II** Finite differences, differentiation and integration, ordinary and partial differential equations, linear programming. *Prerequisite:* 237. Three hours. Staff.

239 **INTEGRAL TRANSFORMS** The theory of Fourier, Laplace, Hankel and Mellin transforms with applications to fluid dynamics, elasticity, physics. *Prerequisite:* 231. Three hours. Mr. Burgmeier.

240 **OPERATIONAL MATHEMATICS** Orthogonal functions, transforms and boundary value problems. *Prerequisite:* 230 or 271. Three hours. Staff.

241, 242 **ADVANCED CALCULUS** The calculus beginning with limits, continuity, differentiation, and Riemann integrals; treatment of those topics not included in the earlier course as a foundation for more advanced courses in analysis and applied mathematics. *Prerequisites:* 102 recommended; 241 for 242. Three hours. Staff.

251 **MODERN HIGHER ALGEBRA** Fundamental concepts of Abstract Algebra. Sets, mappings, groups, rings, integral domains, fields, homomorphisms and isomorphisms. *Prerequisite:* 12; 102 highly desirable. Three hours. Staff.

252 **ADVANCED LINEAR ALGEBRA** Linear transformations and vector spaces, including Jordan forms. Symmetric, Hermitian, orthogonal and unitary matrices, and quadratic forms. *Prerequisite:* 124; 251 desirable. Three hours. Staff.

253, 254 **TOPOLOGY** The elements of point set topology: closed sets and open sets in metric spaces, continuous mappings, connection, Peano curves, separation theorems and homotopy. *Prerequisites:* 102 or 242; 253 for 254. Three hours. Staff.

255 **ELEMENTARY NUMBER THEORY** Divisibility, prime numbers, Diophantine equations, congruence of numbers, and methods of solving congruences. *Prerequisite:* 121. Three hours. Staff.

256 **ANALYTIC NUMBER THEORY** Prime numbers, prime number theorem, interchange of summations, Euler phi function, Mobius function, Riemann zeta function. *Prerequisite:* 232. Three hours. Mr. Brock.

257 **THEORY OF GROUPS** The study of the various kinds and structures of groups. *Prerequisite:* 251. Three hours. Staff.

258 **GALOIS THEORY** The study of Galois theory leading to the insolubility of general quintic equations by radicals and theorems on constructions with straightedge and compass. *Prerequisite:* 257. Three hours. Staff.

260 **FOUNDATIONS OF GEOMETRY** Geometry as an axiomatic science; various non-Euclidean geometries; relationships existing between Euclidean plane geometry and other geometries; invariant properties. *Prerequisite:* 12. Three hours. Messrs. Izzo, Meserve and Riggs.

261 **THE DEVELOPMENT OF MATHEMATICS** Besides considering important contributions of outstanding mathematicians of the past, and classical problems of mathematics, the historical development of the concepts of modern mathematics is presented. Three hours. Staff.

262 **GEOMETRY FOR ELEMENTARY SCHOOL TEACHERS** Informal Euclidean geometry, classical constructions, coordinate geometry, inductive and deductive reasoning, convexity, and an introduction to topology. Not open to mathematics majors. *Prerequisite:* 126. Three hours. Mr. Izzo and Mr. Meserve.

263 **PROJECTIVE AND AFFINE GEOMETRIES** The principle of duality, perspectivity, projectivity, harmonic sets, cross ratio, the theorems of Pascal and Brianchon, poles and polars. *Prerequisite:* 124. Three hours. Staff.

264 **VECTOR ANALYSIS** Introduction to general vector methods including the elements of vector algebra and vector calculus with applications to physics and mechanics. *Prerequisite:* 121. Three hours. Staff.

265 **DIFFERENTIAL GEOMETRY** Analytic metric differential geometry of curves and surfaces in ordinary three dimensional space; curvature, torsion. Frenet formulas, involutes, evolutes, developable and ruled surfaces, geodesic curves. *Prerequisite:* 121. Three hours. Staff.

266 **MATHEMATICS OF DIGITAL COMPUTATION FOR TEACHERS** Mathematical theory underlying digital computing machines including assigned problems on a University computer, including programming in computer system language. A portion of the course is devoted to elementary numerical analysis. *Prerequisites:* 121, 124 highly desirable. Three hours. Staff.

271 **APPLIED MATHEMATICS FOR ENGINEERS AND SCIENTISTS I** Matrix Theory, Vector Analysis, Linear Ordinary Differential Equations. Emphasis on methods of solution, including numerical methods. For a mathematics concentration, a sequence beginning with 230 is advised. *Prerequisites:* 123 and knowledge of computer system programming. Three hours. Staff.

272 **APPLIED MATHEMATICS FOR ENGINEERS AND SCIENTISTS II** Partial Differential Equations of Mathematical Physics, Calculus of Variations, Functions of a Complex Variable, Cauchy's Theorem, integral formula, conformal mapping. *Prerequisite:* 271. Three hours. Staff.

279, 280 **SENIOR PROBLEM** Investigation of some area or problem, under the direction of an assigned staff member, culminating in a report. This course is available only to candidates for the Bachelor of Science degree in Mathematics. *Prerequisite:* departmental permission. Three hours. Staff.

281 **SPECIAL TOPICS IN APPLIED MATHEMATICS** For advanced students in the field of applied mathematics. Lectures, reports and directed readings on advanced

topics in applied mathematics. *Prerequisite:* 232. Credit as arranged. Offered as occasion warrants. Staff.

283 **SPECIAL TOPICS IN COMPUTER SCIENCE** For advanced students in the field of computer science. Directed reading and research on topics in the area of computers. *Prerequisite:* 216. Credit as arranged. Offered as occasion warrants. Staff.

285 **SPECIAL TOPICS IN STATISTICS** For advanced students in the field of statistics. Lectures, reports and directed readings on advanced topics in statistics. *Prerequisite:* permission of department. Credit as arranged. Offered as occasion warrants. Staff.

287 **SPECIAL TOPICS IN ALGEBRA** For advanced students in the field of algebra. Lectures, reports and directed readings on advanced topics in algebra. *Prerequisites:* 251 and consent of instructor. Credit as arranged. Offered as occasion warrants. Staff.

289 **SPECIAL TOPICS IN TOPOLOGY** For advanced students in the field of topology. Lectures, reports and directed readings on advanced topics in topology. *Prerequisites:* 254 and consent of instructor. Credit as arranged. Offered as occasion warrants. Staff.

291 **SPECIAL TOPICS IN GEOMETRY** For advanced students in the field of geometry. Lectures, reports and directed readings on advanced topics in geometry. *Prerequisites:* 263 or 265 and consent of instructor. Credit as arranged. Offered as occasion warrants. Staff.

293 **SPECIAL TOPICS IN ANALYSIS** For advanced students in the field of analysis. Lectures, reports and directed readings on advanced topics in analysis. *Prerequisites:* 232 or 234 and consent of instructor. Credit as arranged. Offered as occasion warrants. Staff.

Other Courses in Mathematics

In addition to the courses offered during the academic year, the following courses may be offered in summer sessions and in the evening division program.

<i>Number</i>	<i>Title</i>	<i>Credit Hours</i>
A15	Plane Analytic Geometry	3
A16	Differential Calculus	3
A17	Integral Calculus	3
A18	Intermediate Calculus	3
A19	Differential Equations	3
S45	Coordinate Geometry and Vectors	3
S46	Elementary Functions	3
S47	Calculus I	3
S48	Calculus II	3
S142	Fundamental Concepts of Algebra	3
S144	Statistics and Probability	3

Medical Microbiology

COLLEGE OF MEDICINE

Professors Stinebring (Chairman), Merchant; Associate Professors Phillips, and Schaeffer; Assistant Professors Absher, Boraker, Moehring, Novotny; Instructor Gallagher.

120 CLINICAL MICROBIOLOGY (3-6) Lectures and laboratory experiments in clinical aspects of microbiology. Fall semester. *Prerequisite:* Microbiology 55. Six hours. Staff.

203 THE MAMMALIAN CELL AS A MICROORGANISM Discussion of such current ideas in cell biology as cell immortality, transformation, dedifferentiation, synchronization, cell-macromolecule interaction; laboratory will illustrate current cell culture techniques as a foundation for the lectures. Designed for biology students of varied training. Four hours. Dr. Moehring and Dr. Schaeffer.

205 PATHOGENIC BACTERIOLOGY Studies of major species of pathogenic bacteria with emphasis on mechanisms of disease production, epidemiology, control measures, and diagnosis. Designed for advanced undergraduate or graduate students interested in phenomenon of parasitism. *Prerequisite:* permission of the instructor. Three hours. Drs. Absher and Stinebring. Alternate years, Spring 1972.

211 GENETICS OF MICROORGANISMS Studies of mutation, genetic information transfer, fine structure of the gene, cytoplasmic inheritance, and lysogeny in fungi, bacteria, and viruses. *Prerequisite:* permission of the instructor. Three hours. Dr. Novotny.

Medical Technology

SCHOOL OF ALLIED HEALTH SCIENCES

Professor Coon (Chairman, Department of Pathology); Assistant Professors Breen, Jones; Instructors Barron, Czerniawski, Kleiler, Russell, Sullivan; Adjunct Instructors Albarelli, Ballard, Cote, Hodnett, Isham, Letourneau, Merrill, Pollard, Scanlon, Thomas and Wilburn.

Note: All courses limited to students of Medical Technology except by permission of the Departmental Chairman.

1-2 DYNAMICS OF HEALTH CARE See Technical Nursing.

3 MEDICAL TECHNOLOGY Medical Terminology. Terminology related to medical science and Hospital services. Required of all students in the Department of Medical Technology, open to other Health Science students by permission of departmental chairman. One hour. Staff.

11 LABORATORY SCIENCE Integrates the subject matter from the "Core" course, (Integrated Science) to the specific discipline of medical laboratory science. In-depth needs as they relate to (a) Structure (anatomy and physiology),

(b) Dynamics (function), (c) Control (regulation), (d) Dysfunction, and (e) Adaptation will be provided the student by selfpacing, autotutorial methods, laboratory experiments and small group discussion. Required of all students in the Department of Medical Technology. Three hours. Staff.

20-21 INTRODUCTION TO MEDICAL TECHNOLOGY Techniques of basic laboratory procedures in hematology, serology, blood banking, chemistry and urinalysis. Required of students in the Medical Laboratory Technician program except by permission of departmental chairman. Total—ten hours.

40-41 MEDICAL TECHNOLOGY Clinical Practicum. Rotating assignments in Hematology, Immunohematology, Clinical Chemistry, and Microbiology-Urinalysis-Serology in the clinical laboratories provided by the Medical Center Hospital and other approved facilities. Required of students in the Department of Medical Technology. Fall and spring semesters. Total—eleven hours. Staff.

101 MEDICAL TECHNOLOGY (2-6) Principles, procedures, and special techniques in medical technology. Includes hematology, immunohematology, serology, and urinalysis. Spring semester. Four hours. Staff.

102 MEDICAL TECHNOLOGY (2-6) Continuation of 101; includes histologic technique, introduction to cytopathology, parasitology. *Prerequisite:* 101. Fall semester. Four hours. Staff.

103 MEDICAL TECHNOLOGY Lectures on special problems in medical technology and individual research, Spring semester. One hour. Staff.

110 MEDICAL TECHNOLOGY Clinical Conferences. Participation in clinical conferences in all "divisions" of the laboratory. Two hours. Staff.

140, 141 CLINICAL PRACTICUM. Rotating assignments in the laboratories of the Medical Center and other approved facilities. Fall and spring semesters. Total of fourteen hours. Staff.

197-198 MEDICAL TECHNOLOGY Assigned reading and special problems. Designed to develop independent capabilities of medical technologists in solving laboratory problems. One credit, fall semester. Two credits, spring semester. Staff.

201 MEDICAL TECHNOLOGY, ADVANCED Individual research in the field of medical technology. *Prerequisite:* departmental permission. Credit as arranged. Fall and spring semesters. Dr. Coon.

Microbiology and Biochemistry

COLLEGES OF AGRICULTURE AND HOME ECONOMICS

Professors Little and Racusen (Chairman); Associate Professors Foote, Sjogren, and Weller; Instructor Husted.

55 INTRODUCTORY MICROBIOLOGY (2-4) The study of microorganisms, especially bacteria, their structure, development and activities. *Prerequisite:* eight hours of chemistry. Four hours. Mr. Sjogren. Also offered each spring.

197, 198 UNDERGRADUATE RESEARCH *Prerequisite:* Departmental permission. One to three hours. Staff.

201 **GENERAL BIOCHEMISTRY (3-3)** Broad coverage of biochemistry including principles of analytical biochemistry. *Prerequisite:* Chemistry 16 or 131. Four hours. Mr. Foote. Also offered each spring by Mr. Little.

202 **ADVANCED BIOCHEMISTRY (3-3)** A study of metabolic cycles with emphasis on research methods involving radioisotopes and chromatography. *Prerequisite:* 201 or 203 or permission of the instructor. Four hours. Mr. Racusen.

203 **MOLECULAR BIOLOGY (3-3)** The structure and biological function of nucleic acids, proteins, and enzymes. Emphasis is on optical, electrophoretic, and ultracentrifugal methods. *Prerequisite:* Chemistry 140 or 142 or permission of instructor. Four hours. Mr. Weller.

220 **ENVIRONMENTAL MICROBIOLOGY (2-3)** The activities of microorganisms, primarily bacteria, in air, soil, and water. *Prerequisite:* a previous course in microbiology. Three hours. Mr. Sjogren. Alternate years, 1973-74.

254 **MICROBIAL BIOCHEMISTRY (2-4)** The chemical composition and metabolism of microbial cells. *Prerequisite:* 55, 201, or permission of instructor. Four hours. Mr. Sjogren. Alternate years, 1972-73.

Military Studies

Lieutenant Colonel Haponski (Chairman); Majors Dubov and McCune; Captains Riederer and Segura.

Note: MS 1, 2, 11, 12, 211, 212 are designed not just for ROTC cadets, but all University students interested in the part military forces play in national and international affairs.

1 **INTRODUCTION TO MILITARY STUDIES (2-1*)** Principles of war, philosophies of military employment, economics of national security.

2 **U. S. DEFENSE ESTABLISHMENT (2-1*)** Current organization, strategy, employment, cost.

11 (HIST 181) **U. S. MILITARY HISTORY (2-1*)** Development of American Military Establishment within framework of American History from Colonial Era to the present. Taught by History Department. Required of ROTC cadets.

12 **CONTEMPORARY WORLD MILITARY SCENE (2-1*)** Current international uses of military forces, viewed against a background of long-range national concerns, especially of U.S., Western European countries, USSR, China.

101-102 **LEADERSHIP AND MANAGEMENT I (3-1)** Fundamentals through platoon level. Primarily for ROTC cadets.

111-112 **LEADERSHIP AND MANAGEMENT II (3-1)** Fundamentals at company and battalion level. Primarily for ROTC cadets.

211-212 **SPECIAL STUDIES** Credit, topic to be arranged. Individual research. *Prerequisite:* MS 1, 2, 11, 12 or equivalent by permission of Chairman.

* Lab/Fld trip required only for ROTC cadets.

Music

COLLEGE OF ARTS AND SCIENCES

Professors Lidral (Chairman) and Pappoutsakis; Associate Professors Chapman, D. Kinsey, and Schultz; Assistant Professors T. Read, Weinrich, and Wigness; Instructors Lawes, J. Ambrose, Anand, Auchter, Dahl, Fleming, Hartman, F. Kinsey, E. Metcalfe, Peterson, Powell and E. Read; Lecturer Bemis.

Students in all music courses are required to attend a designated portion of major ensemble concerts, faculty recitals, and formal student recitals as part of the course requirements.

Theory and Composition

5-6 **THEORY I (2-3)** Melodic and rhythmic dictation, sight singing, and elementary harmony. Three hours. Mr. Read and Miss Fleming.

9 **INTRODUCTORY MUSIC—THEORY** Fundamentals of music: major and minor scales, intervals, transposition, rudiments of harmony, rhythm, terminology, the conventions of musical notation. Three hours.¹ Messrs. Pappoutsakis and Weinrich.

105-106 **THEORY II (2-3)** Contrapuntal and harmonic dictation, advanced harmony, and elementary counterpoint. *Prerequisite:* 5-6. Three hours. Mr. Lidral.

203, 204 **ORCHESTRATION** First semester: characteristics of instruments, arranging for orchestra; second semester: advanced exercises in orchestral scoring. *Prerequisite:* 105-106; 203 for 204. Three hours. Mr. Pappoutsakis. 204 in alternate years, 1972-73.

205, 206 **COUNTERPOINT** First semester: tonal counterpoint; second semester: canon and fugue. *Prerequisite:* 105-106; 205 for 206. Three hours. Mr. Kinsey. 206 in alternate years, 1973-74.

207 **PEDAGOGY OF THEORY** Objectives, viewpoints, content and specific approach to the organization and teaching of theory courses. *Prerequisite:* eighteen hours in theory. Three hours. Mr. Lidral.

208 **FORM AND ANALYSIS** Creative approach to aural and sight analysis of musical construction. *Prerequisite:* 105-106; 205 recommended. Three hours. Mr. Kinsey.

215, 216 **COMPOSITION** Creative work in free composition with instruction according to the needs and capabilities of the individual student. *Prerequisite:* 205 and 208 or consent of instructor. Three hours. May be repeated for credit. Mr. Read.

History and Literature

1,2 **SURVEY OF MUSICAL LITERATURE** First semester: the Classical and Romantic eras in songs and piano pieces, program music, and the symphony and the concerto. Second semester: Gregorian chant to Handel and Bach, opera,

1. Enrollment in 5 will cancel credit for 9.

postromanticism, modern music, and American music. Three hours. Messrs. Kinsey, Lawes, and Wigness; Mrs. Ambrose and Mrs. Anand.

10 **INTRODUCTORY MUSIC—LISTENING** A study, from the listener's point of view, of music from the Baroque through the Classical and Romantic to the twentieth century contemporary periods. Stylistic, structural, and orchestral developments. Three hours.² Messrs. Pappoutsakis, Weinrich, and Wigness.

13 **CONTEMPORARY MUSIC** Development and stylistic characteristics of twentieth century music from the late Romanticists to the experimentalists. Both European and American composers will be presented. *Prerequisite:* 1, 2, or 10. Three hours. Mr. Read.

14 **JAZZ LITERATURE** The history of jazz music: African and American backgrounds; transition to jazz, growth, early jazz, further developments in the decades from the teens to the present. *Prerequisite:* Music 1, 2, or 10. Three hours. Mr. Bemis.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READING AND RESEARCH**

221, 222 **HISTORY OF MUSIC** Changes in musical structure and style in relation to contemporaneous artistic, literary, religious, and social movements. First semester: Gregorian chant to the Baroque era. Second semester: Baroque to Modern. *Prerequisite:* 1, 2 and 5-6. Three hours. Mr. Chapman.

223 through 228 **MUSIC LITERATURE** Advanced studies in the literature of music. *Prerequisite:* 105-106 and 221, 222. Three hours. Mr. Chapman.

245, 246 **CHAMBER MUSIC LITERATURE** Study through analysis and performance of masterworks for small groups leading to public performance. *Prerequisite:* twelve hours or the equivalent in performance field and departmental permission. One hour. Staff.

281 through 284 **INDEPENDENT STUDY** Studies in theory, composition, history, or literature under the direction of an assigned staff member for advanced students and candidates for honors. Credit as arranged.

For Music Education, see page 104.

Performance

For the fees for instruction, see page 54.

A senior recital in the performance major field is required of all music majors. Regular appearances in informal recitals are required of all performance students. Appearance in one formal departmental recital a semester is required of all music majors. At the end of each semester jury examinations are given in applied music.

All music majors on any curriculum are required to pass a **FUNCTIONAL PIANO FACILITY** examination before certification for graduation. This will include:

a. Ability to sight-read songs of the type found in a community song book.

2. Enrollment in 1 and 2 will cancel credit for 10.

- b. Ability to harmonize at sight; to improvise a simple piano accompaniment for songs requiring the use of I, IV, and V chords and some simple modulations; to transpose the songs and harmonizations to other keys.
- c. Ability to sight-read fairly fluently simple accompaniments, vocal or instrumental, and simple piano compositions of the type used for school rhythmic activities.

41, 42 **MAJOR ENSEMBLES (0-3)** University Band, Choir, Choral Union, and Orchestra. Attendance at all rehearsals and public performances required. *Prerequisite:* departmental permission. One hour.¹ Messrs. Chapman, Lidral, Schultz, and Weinrich.

45, 46 **CHAMBER MUSIC (0-2)** Study and performance of masterworks for small groups. Attendance at all rehearsals and public performances required. Outside practice required. *Prerequisite:* departmental permission. One hour.¹ Staff.

51, 52 **PERFORMANCE STUDY** Individual instruction in piano, organ, harpsichord, voice, strings, woodwinds, brass, percussion, and harp. One to four hours.¹ Staff.

Letter code for performance study and advanced performance study:

A. Piano (harpsichord)	G. Clarinet (saxophone)	M. Percussion
B. Voice	H. Bassoon	N. Violin
C. Organ	I. Horn	O. Viola
D. Harp (guitar)	J. Trumpet	P. Violoncello
E. Flute	K. Trombone (euphonium)	Q. Bass
F. Oboe	L. Tuba	R. Recital

71, 72 **CLASS STUDY (0-2)** Required of music education students, elective to others to limit of facilities and equipment. Class study in performance fields of voice, strings, woodwinds, brass, and percussion. One hour.¹ Staff.

74 **INSTRUMENT REPAIR CLASS (0-2)** A laboratory for music education students in minor repair and adjustment of string, woodwind, brass, and percussion instruments. *Prerequisite:* string, woodwind, brass, and percussion classes or concurrent enrollment and departmental permission. One hour. Mr. Schultz.

111 **MUSIC for ELEMENTARY TEACHERS** The development of musical skills, understandings, and attitudes pertinent to the teaching of music in the elementary classroom. *Prerequisite:* Sophomore standing. Three hours. Messrs. Lawes and Wigness.

112 **ELEMENTARY MUSIC METHODS** A course to aid the elementary classroom teacher in developing the potential musicality of students to the highest level through the practical application of musical skills and understandings already acquired by the teacher. *Prerequisite:* 111. Three hours. Messrs. Lawes and Wigness.

1. Indicated courses in performance may be repeated for credit. Each hour of credit in performance study requires one hour's practice per day, and credit will be given only on condition that the instruction be accompanied or preceded by a three-credit course in music and participation in ensemble, unless excused from the latter by the chairman.

211, 212 CONDUCTING (2-2) First semester: technique of the baton, score reading, laboratory practice; second semester: preparation and performance of selected scores, including rehearsal procedures. Selected students may conduct University major ensembles. *Prerequisite:* 5-6, 211 for 212. Three hours. Mr. Pappoutsakis. 212 in alternate years, 1973-74.

271, 272 PERFORMANCE PEDAGOGY Methods of teaching voice, strings, woodwinds, brass, percussion, or keyboard instruments including repertoire suitable for use at various levels of ability. Significant literature of all historical periods in the major field. *Prerequisite:* Senior standing in performance and consent of instructor. Three hours. Staff.

Nursing

DIVISION OF HEALTH SCIENCES

Professor Woodruff (Director).

Professional Nursing: Professors Woodruff (Chairman) and Milligan; Associate Professors Cronin, Demers,¹ Emerson, Folta, Forgione, Palmer, Powell, Sawyer, Schwalb, and Whitaker; Assistant Professors Barrett, Deck, Magee, Marsland, Murray, Rodgers,² Scranton, and Ure; Instructors Burroughs, Quinn, and Suess; Teaching Associates Barry, Danielson, and Lalumiere.

Technical Nursing: Associate Professors Allen (Chairman) and Phillips; Instructors Clark, Foreman, Foster, Gray, Rule, and Spurlock; Teaching Associate Hall.

Professional Nursing

21-22 INTRODUCTORY NURSING (2-16) First semester: Development of understandings, attitudes, and skills necessary to performance of basic activities involved in the nursing care of adults. Laboratory experience in classroom, hospital, and rehabilitation center. Second Semester: Development of understandings, attitudes, and skills necessary in giving nursing care to adults who face illnesses which have a favorable or controllable outcome. Laboratory experiences in classroom, hospital, and rehabilitation center with emphasis on the ability to assume increased responsibility for patient care. Six hours. Mrs. Barry, Danielson, Lalumiere, Murray, and Palmer; Misses Sawyer, Scranton and Suess.

121 INTERMEDIATE NURSING: MATERNAL-CHILD NURSING (4-20) Development of knowledge and skills in maternal and child care with focus on the nurse-child-family relationships. Laboratory experiences include observation and participation in the hospital and out-patient environments. Nine hours. Misses Forgione and Schwalb; Mrs. Marsland and Burroughs.

122 INTERMEDIATE NURSING (4-20) Development of understandings, attitudes, and skills necessary in giving nursing care to adults who face illnesses

1. On sabbatical 1970-1971.
2. On leave 1970-1971.

which require considerable adjustments in behavioral and living patterns. Laboratory experience in classroom, hospital, rehabilitation center, clinics, and selected community settings. Nine hours. Mrs. Barry, Danielson, Lalumiere, Murray, and Palmer; Misses Sawyer, Scranton, and Suess.

156 **PSYCHIATRIC NURSING (4-8)** Principles of nursing care of patients with psychiatric problems in hospitals and other settings. The emphasis will be on the development of therapeutic relationships with selected patients and upon the nurses's role with patients in various treatment situations. Six hours. Miss Magee and Mrs. Ure.

164 **ADVANCED NURSING (3-12)** Opportunity is provided to develop understanding of the concepts and skills necessary to provide direct nursing care to the critically ill patient and the patient in the emergency situation and to develop leadership competencies through experience in directing care for groups of patients. Six hours. Sister Barrett, r.h.s.j. and Mrs. Quinn.

176 **COMMUNITY HEALTH NURSING (4-8)** Study and discussion of the development, functions and trends in official and voluntary health organizations with emphasis on the role of the nurse at the local, state, national and international level. Laboratory study provided in the community. Six hours. Miss Emerson and Mrs. Cronin.

186 **SURVEY OF CONTEMPORARY NURSING** Influence of contemporary social, educational, political and economic developments on nursing; problems and issues in the profession today; professional organizations in nursing and responsibilities of the professional nurse. Three hours. Miss Milligan.

Technical Nursing

1-2 **DYNAMICS OF HEALTH CARE** Introduction to the whole pattern of comprehensive health care: a core course for students in the programs in Technical Nursing, Dental Hygiene, Medical Technology, Physical Therapy, Radiologic Technology, and the Program for Medical Laboratory Technicians. Two hour per semester. Nursing and Allied Health Staff. Fall semester.

11-12 **FUNDAMENTALS OF NURSING (2-6)** A basic course in the principles of nursing care. The entire sequence focuses on nursing interventions to meet the physiological, safety, and individuality needs of all persons. Within each course, specific needs of man are presented in depth with learning opportunities to develop related skills and to adapt these skills to specific age levels. Concurrent experiences are planned in hospitals and community agencies. Four hours. Miss Foreman, Mrs. Hall, Rule, and Spurlock.

14 **FUNDAMENTALS OF NURSING (four weeks summer session)** Continuation of Nursing 11-12. *Prerequisite:* Nursing 11-12 and PSL 10. Four hours. Miss Foreman, Mrs. Hall, Rule, and Mrs. Spurlock.

27-28 **NURSING CARE OF CHILDREN AND ADULTS (4-15), (5-15)** These two continuous courses focus on nursing interventions necessary to meet changing needs of children and adults in various stages of the wellness-illness continuum. Within each course, content is presented within a framework of broad psychosocial and pathophysiological concepts in which principles of nursing care are emphasized. Clinical learning experiences focus on the adaptation and application of nursing principles to individual patient care situations, including maternal and infant care and care of children and adults with varying alterations in physiological and/or psychological functioning. *Prerequisite:* Nursing 14. 27, nine hours; 28, ten hours. Mrs. Clarke, Mrs. Fink, Misses Foster and Gray.

30 NURSING TRENDS This course is designed to increase the student's understanding of the role of the technical nurse within the profession of nursing. Past and current trends in nursing are reviewed in relation to future goals. *Prerequisite:* Nursing 27. Two hours. Miss Allen.

Pathology

COLLEGE OF MEDICINE

Professors Coon (Chairman), Craighead, Korson, Kusserow; Associate Professors Clemmons, Duffell, Picoff, Rice, Stark, Taylor, Trainer; Assistant Professors Harris, Howard, Kanich, Kaye, Tihen.

101 INTRODUCTION TO HUMAN DISEASE (2-3) This is an elementary course in human pathology designed for Allied Health students. The first portion will deal with general mechanisms of disease, to be followed by disorders of specific organs. *Prerequisite:* 1 year college level general biology or equivalent and permission of departmental chairman. Three hours. Dr. Taylor and Staff.

201 HISTOCHEMISTRY A survey of techniques used for chemical identification of cellular and tissue components, including discussion of underlying theories. *Prerequisite:* an acceptable course in cell structure (e.g., Anatomy 311, Botany 256); Chemistry 131-132; permission of the department. A course in biochemistry is strongly recommended. Credit as arranged. Not offered each year. Dr. Korson.

Pharmacology

COLLEGE OF MEDICINE

Professors Gans, Jaffe, and Smith (Chairman); Associate Professors Doremus, Gray, McCormack, Reit, Robinson; Visiting Professor Maxwell.

289 PHARMACOLOGY Environmental toxicology. [Physiologic and ecologic consequences of introducing foreign chemicals into the environment.] *Prerequisite:* Chemistry 131-132. Background in biological sciences desirable. 3 credit hours. Dr. Gans.

290 PHARMACOLOGY Systemic pharmacology. [Emphasis on neuropharmacology, endocrinology and chemotherapy.] *Prerequisites:* Chemistry 131-132 and background in biological sciences. 5 credit hours. Dr. Gans.

Philosophy and Religion

COLLEGE OF ARTS AND SCIENCES

Professors Dykhuizen (emeritus), Hall (Chairman), and Sadler; Associate Professor Kahn; Assistant Professors Andrews, Beckett, Martin, Miller, Paden, Paskow, Rice, and Yarian; Instructors Anderson, Bailey, Brenneman, Corcoran, Gussner, and Swanson.

Philosophy

3 LOGIC Principles and conditions of correct thinking with emphasis on the detection of fallacies of thought. Three hours. Mr. Beckett.

4 ETHICS Examinations of the ideas underlying man's moral behaviour to develop an acceptable and coherent theory of conduct. Three hours. Staff.

5 INTRODUCTION TO PHILOSOPHICAL PROBLEMS An introduction to philosophy and its methods through certain general problems: knowledge and experience, God, religion, the self, moral and aesthetic values, freedom and determinism. Three hours. Staff.

21, 22 INTRODUCTION TO PHILOSOPHY A systematic analysis of the thought of such leading philosophers as Plato, Aristotle, Descartes, Spinoza, Hume and Kant on such topics as Theory of Knowledge, Ethics, Political Philosophy, and Theory of Art. Three hours. Staff.

101, 102 HISTORY OF PHILOSOPHY First semester: ancient philosophy; second semester: modern philosophy through Kant. *Prerequisite:* one introductory course in philosophy. Three hours. Msrs. Miller and Rice.

151 PHILOSOPHY AND LITERATURE Selected philosophical works and the literary works they have influenced. *Prerequisite:* one course in philosophy. Three hours. Mr. Hall.

152 PHILOSOPHY OF THE ARTS An analysis of some principal theories of art as exemplified in music, literature and painting. *Prerequisite:* one introductory course in philosophy. Three hours. Mr. Hall.

153 PHILOSOPHY OF SCIENCE Some philosophical problems closely associated with the scientific enterprise: scientific explanation, interpretations of the concept of probability, the justification of induction, causality, space and time. Emphasis on current attempts at their solution. *Prerequisite:* a course in philosophy or science. Three hours. Mr. Beckett.

154 PHILOSOPHY OF RELIGION A critical analysis of the basic concepts and values which have emerged from man's religious experience. *Prerequisite:* one introductory course in philosophy, or religion 21 or 22. Three hours. Mr. Hall.

175 CHINESE RELIGION AND THOUGHT Three hours. Mr. Andrews. See Religion 175.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

202 ANALYTIC PHILOSOPHY The significant problems of philosophy from the

standpoint of the predominant contemporary philosophic movement in England and the United States. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Beckett.

203 CONTEMPORARY ETHICAL THEORY An intensive study of the contributions of leading ethical philosophers since G. E. Moore in ethical theory and metaethics. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Beckett.

204 THEORY OF KNOWLEDGE A study of basic concepts and problems involved in explaining the possibility of human knowledge. Topics such as sense perception, memory, truth, necessity, knowledge and belief, and the possibility and limit of human knowledge will be considered. Three hours. Mr. Rice.

206 SOCIAL PHILOSOPHY The meaning and values inherent in social life. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Anderson.

207 METAPHYSICS Current and traditional metaphysical problems such as the concept of change, the existence and nature of God, the self, and the world. *Prerequisite:* two advanced courses in philosophy. Three hours. Staff.

208 THEORY OF VALUE An analysis of the nature of value and the nature of experience of the various realms of value. *Prerequisite:* two advanced courses in philosophy. Three hours. Staff.

209 AMERICAN PHILOSOPHY The thought of such leading American philosophers as Peirce, James, Royce, Santayana, Dewey and Whitehead. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Miller.

211 NINETEENTH-CENTURY PHILOSOPHY A systematic analysis of the contributions to philosophical thought of such thinkers as Hegel, Marx, and Nietzsche. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Corcoran.

212 EXISTENTIALISM Existentialism, its sources and its relation to literature and to the arts. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Hall.

214 INTELLECTUAL BACKGROUNDS OF MODERN LIFE Intellectual movements which have influenced the thought and life of today. *Prerequisite:* two advanced courses in philosophy. Three hours. Mr. Rice.

281, 282 SEMINAR Selected topics in philosophy, determined according to the interest of students and instructor. *Prerequisite:* two advanced courses in philosophy. Three hours. Staff.

For economic philosophy, see economics 295; and for political philosophy, see political science 211, 212; and for mathematical logic, see mathematics 259, 260.

Religion

21,22 INTRODUCTION TO THE STUDY OF RELIGION First semester: focus on basic writings and developments in Asian religious traditions, especially Hindu, Buddhist, Confucian and Taoist. Second semester: basic motifs and developments in the religious heritage of the West. Three hours. Staff.

101 RELIGIOUS INSTITUTIONS AND COMMUNITIES A comparative study of the basic types of religious community and religious institution, within various cultural settings. *Prerequisite:* three hours in religion or sociology 22; sophomore standing. Three hours. Staff.

112 **MYSTICISM, SHAMANISM, AND POSSESSION** A comparative study of the ways in which the inward dimension of the religious life finds expression. *Prerequisite:* three hours in religion or anthropology 21; sophomore standing. Three hours. Staff.

122 **MYTH, SYMBOL, AND RITUAL** Study of the meaning and varieties of myth and ritual in cross-cultural perspective, with reference to contemporary theories of symbol and language. *Prerequisite:* three hours in religion; sophomore standing. Three hours. Staff.

129 **PHILOSOPHY OF RELIGION** Three hours. Mr. Hall. See Philosophy 154.

141 **HEBREW SCRIPTURES** Study of the history and writings of the Hebraic-Judaic religion to the first century B.C. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Messrs. Martin and Kahn.

142 **POST-BIBLICAL JUDAISM** A study of the formation of post-biblical Judaism with special attention to the Rabbinic period, 70-500 A.D. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Mr. Kahn.

145 **PRIMITIVE CHRISTIANITY** The origin and nature of early Christianity with emphasis on the New Testament writings. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Mr. Martin.

148 **HELLENISTIC RELIGION** A study of religion in the Mediterranean area during the period from the second century B.C. through the second century A.D. *Prerequisite:* six hours in religion; sophomore standing. Three hours. Mr. Martin.

151 **MODES OF CHRISTIAN EXPRESSION** A study of the teaching, liturgy, art and piety of the Christian religion during its history up to the 16th century. *Prerequisite:* six hours in religion. Three hours. Mr. Yarian.

156 **RELIGION IN AMERICA** A study of the relationship between religion, the cultural ethos, and individual self-understanding in America. *Prerequisite:* six hours in religion, including Religion 22. Three hours. Mr. Martin.

161 **STUDIES IN THE HINDU TRADITION** Selected texts, practices, and developments in the Hindu tradition. *Prerequisite:* six hours in religion, including Rel. 21; sophomore standing. Three hours. Mr. Gussner.

166 **STUDIES IN THE BUDDHIST TRADITION** Selected texts, disciplines, and doctrinal developments in Indian, Tibetan, and Chinese Buddhism. *Prerequisite:* six hours in religion, including Religion 21; sophomore standing. Three hours. Messrs. Gussner and Andrews.

171, 172 **JAPANESE RELIGION** The religion of shrine and temple, of Shinto and Buddhism, and their interaction with the rich folk traditions of Japan. *Prerequisite:* six hours in religion, including Rel. 21; sophomore standing. Three hours. Messrs. Sadler and Andrews.

175 **CHINESE RELIGION AND THOUGHT** A survey of the religious and philosophical traditions and movements of premodern China. *Prerequisite:* six hours in religion or philosophy, including Rel. 21 or Phil. 21; sophomore standing. Three hours. Mr. Andrews.

181 **'PRIMITIVE' RELIGIONS** An introduction to the anthropological study of religion, including a critical examination of the classic theories of religious origins and essences, with a variety of references to field reports on religious phenomena in small-scale societies. *Prerequisite:* three hours in religion or three hours in anthropology; sophomore standing. Three hours. Mr. Sadler.

182 **STUDIES IN FOLK RELIGION** A study of folk tales, folk cults and festivals, folk deities, ogres, demons and "little people," in various cultures, and their relationship to the great traditions. *Prerequisite:* six hours in religion; junior standing. Three hours. Mr. Sadler.

187 **RELIGION AND SECULAR CULTURE** Study of the relation between religion and secularization, and of new forms of religious expression and interpretation. *Prerequisite:* six hours in religion; junior standing. Three hours. Mr. Paden.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **READINGS AND RESEARCH**

201 **THEORY AND METHOD** Critical examination of some of the major theories and methods used in studying and interpreting religion. *Prerequisite:* nine hours in religion; junior standing. Three hours. Staff.

281, 282 **PROBLEMS IN THE HISTORY AND PHENOMENOLOGY OF RELIGION** Topics of current concern to historians of religions. *Prerequisite:* nine hours in religion; junior standing. Three hours. Staff.

297, 298 **INTERDISCIPLINARY SEMINAR** Student-faculty workshop on a topic of current interest, employing resources from various disciplines. *Prerequisite:* nine hours in religion; junior standing, and permission of the instructor. Three hours. Staff.

Physical Therapy

SCHOOL OF ALLIED HEALTH SCIENCES

Associate Professor Feitelberg (Director, Physical Therapy Program); Assistant Professors Anderson, Page.

22 **PHYSICAL THERAPY I** History and current trends of the profession with emphasis on the medical-ethical-legal aspects of practice. The role of the therapist in treatment, the health care environment and as a team member. Supervised observation in approved clinical centers. (2 hours) Mr. Feitelberg and faculty.

109 **NEUROSCIENCES FOR PHYSICAL THERAPY** A study of the concepts in Neuroanatomy and Neurophysiology that contribute to physical therapy. Lectures and clinical presentations. (2 hours) Miss Anderson, Miss Page and faculty.

111 **KINESIOLOGY** The study of normal posture and movement, from infancy through adulthood as a basis for analysis of abnormal function. Biomechanical principles of the musculoskeletal and nervous systems are studied in relation to pathomechanics. Lecture, laboratory. (3 hours) Miss Page.

121-122 **PHYSICAL THERAPY II, III** The study of the evaluation process in physical therapy utilizing testing and measurement methods and devices. Patient management and treatment through medical, nursing and physical therapy techniques. Theory and application of principles in massage, electrotherapy, hydrotherapy and therapeutic exercise for the treatment of disease and disability. Lecture, laboratory, patient demonstration and clinical experience. (II 4 hours) (III 5 hours) Miss Anderson, Miss Corbin, Mr. Feitelberg, Miss Page, Mrs. Tarre and clinical faculty.

132 CLINICAL MEDICINE Management of disease processes in the major medical specialties such as General Medicine, Orthopaedics, Neurology, Pediatrics and Rehabilitation Medicine. Utilization of the problem oriented medical record as a basis for understanding the concept of comprehensive care. Lecture and clinical presentations. (4 hours) Faculty, College of Medicine.

142 INDEPENDENT STUDY The selection and development of a topic for investigation using an assigned faculty member as a preceptor. Seminar sessions for guidance and problem solving on related issues. (2 hours) Faculty.

151-152 PHYSICAL THERAPY IV, V Continued studies in the advanced evaluation process. Theory and application of therapeutic exercise utilizing neuromuscular facilitation techniques. In depth study of ambulation techniques, activities of daily living, assistive devices, prosthetic and orthotics and related allied health disciplines. Emphasis on goal determination, treatment design and modification. Analysis and synthesis of clinical education experiences. Investigation of more complex medical problems and their management. Lecture, laboratory and clinical presentation. (IV 5 hours) (V 3 hours) Miss Anderson, Miss Page, Mrs. Tarre and clinical faculty.

161 PSYCHOLOGICAL ASPECTS OF PHYSICAL DISABILITY Consideration of the reactions to illness and disability and associated emotional and personality changes. Emphasis on developing methods to modify behavior for effective treatment and teaching of the disabled and the family. (2 hours) TBA

171 COMMUNITY HEALTH CARE Consideration of the social science aspects of health care, community health services, manpower needs and emerging patterns for health care systems. Small group participation in problem-solving projects. Concurrent exposure to the principles, logic and technique of statistics. (3 hours) TBA

172 PRINCIPLES OF ORGANIZATION AND ADMINISTRATION Analysis of current designs and methods used in existing physical therapy facilities. Opportunity to investigate concepts for projecting new patterns to meet the needs of future health care systems. Study of communication theories fundamental to the process of change. Group activity to design alternate models based on problem solving. (2 hours) Mr. Feitelberg and clinical faculty.

174 PRINCIPLES OF EDUCATION Introduction to procedures and methods of instruction in various teaching situations. Opportunity to design and participate in a teaching activity. Introduction to the preparation and use of instructional aids. (2 hours) Faculty.

176 RESEARCH METHODS Introduction to the fundamentals of research design. Analysis of current research activities in physical therapy with an opportunity to identify and explore new areas for study. (2 hours) Faculty.

128 CLINICAL EDUCATION I Students are assigned to a variety of approved clinical centers for supervised observation and participation. Learning experiences are designed in cooperation with the clinical faculty in keeping with the level of competency acquired. (3 hours) (Full time, 5 week period, May-June) Miss Anderson, Mr. Feitelberg and clinical faculty.

178 CLINICAL EDUCATION II A continuation of Clinical Education I. At this level students fully participate in the evaluation and treatment of patients according to the objectives of the facility. A wide variety of opportunities are planned within the facility and community. Students are assigned full time to two facilities during this period. (5 hours) Full time 10 week period, January-March) Miss Anderson, Mr. Feitelberg and clinical faculty.

V Physics

COLLEGE OF ARTS AND SCIENCES

Professors Crowell (Chairman), Detenbeck, Juenker, Krizan, Nyborg and Scarfone; Associate Professor Brown; Assistant Professors Nagy, Sachs, and Thurnauer.

Physics 1 CELESTIAL PHYSICS: ASTRONOMY AND SPACE-TIME. Description of various historical models of the observable universe. Nature of light and description of optical instruments, especially telescope and camera. Concept of space and time, Einstein's Relativity. Three hours. Mr. Depatie.

Physics 3 INTRODUCTORY PHYSICS (3-2) A one-semester laboratory terminal course in basic physics, designed particularly to meet the needs of students in the vocational programs in the agricultural and health sciences. Four hours. Mr. Nagy.

5, 6 ELEMENTARY PHYSICS (3-2) An introduction to the principles of physics for students not concentrating in physical science or engineering. Demonstration lectures coordinated with laboratory work. *Prerequisite:* 5 for 6; secondary school algebra and trigonometry. Four hours. Staff.

17, 18, 27 GENERAL PHYSICS (2-2, 2-2, 3-2) For students concentrating in engineering or a physical science. *Prerequisite:* for 17, concurrent enrollment or credit in mathematics 11, or 13; for 18, 17 and concurrent enrollment or credit in mathematics 12 or 14; for 27, 18 or departmental permission, and credit or concurrent enrollment in mathematics 121 or 123. Three, three, and four hours. Staff.

128 INTRODUCTORY MODERN PHYSICS (3-2) An introduction to the theory of relativity and to modern descriptions of radiation, the electron, the atom, the atomic nucleus, and elementary particles. *Prerequisite:* 6 or 27 and credit or concurrent enrollment in mathematics 121 or 123. Four hours. Staff.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

Physics 201, 202 EXPERIMENTAL PHYSICS (1-3) Experiments in classical and modern physics. Each student selects laboratory experiments appropriate to his background and interests. The course may be entered at the beginning of either semester and repeated for credit up to a maximum of four semesters. *Prerequisite:* 6 or 27 and mathematics 121 or 123. Three hours. Staff.

211 MECHANICS (3-0) Newtonian dynamics of particles and systems of particles, with applications to problems of special importance, such as driven and coupled harmonic oscillators and central field trajectories. *Prerequisite:* 6 or 27, mathematics 121 or 123. Three hours. Mr. Brown.

213 ELECTRICITY AND MAGNETISM (3-0) Fundamental principles of electricity and magnetism; electrostatic fields, and magnetic fields of steady currents. Electrical and magnetic properties of matter and electromagnetic energy relationships. *Prerequisite:* 6 or 27, mathematics 121 or 123. Three hours. Mr. Nagy.

214 ELECTROMAGNETISM AND RELATIVITY An introduction to time dependent

electromagnetic fields. Maxwell's equations in space and matter. Electromagnetism as a relativistic phenomenon. Special relativity including an introduction to four-vectors. *Prerequisite:* 213. Three hours. Mr. Nyborg.

216 INTRODUCTION TO MATHEMATICAL PHYSICS Introduction to basic mathematical methods of theoretical physics. Particular emphasis on partial differential equations, especially the wave equation. *Prerequisite:* 211 or 213. Three hours. Mr. Depatie.

220 BIOLOGICAL PHYSICS (3-2) Physical laws, concepts and methods discussed with respect to their reference to biology. *Prerequisite:* 6, chemistry 2, mathematics 12. Four hours. Mr. Nyborg. Alternate years.

222 ADVANCED BIOLOGICAL PHYSICS (3-2) Sound and electromagnetic waves; ionizing particles and radiation. Interaction of these physical agents with biological systems. Physical properties of macromolecules and their aggregates. *Prerequisite:* chemistry 2; mathematics 121; and experience in applying differential equations. Departmental permission required. Four hours. Mr. Nyborg. Alternate years.

225, 226, 227 SPECIAL TOPICS IN BIOLOGICAL PHYSICS For research students in the field of biological physics. *Prerequisite:* 122 or 222, mathematics 121 and departmental permission. Credit as arranged. Mr. Nyborg. Offered as occasion warrants.

231, 232, 233 SPECIAL TOPICS IN ACOUSTICS For research students in the field of acoustics. *Prerequisite:* 212 and departmental permission. Credit as arranged. Messrs. Nyborg and Sachs. Offered as occasion warrants.

251, 252, 253 SPECIAL TOPICS IN THE PHYSICS OF SURFACES For research students in the field of surface chemistry and physics. *Prerequisite:* 265, or chemistry 142, mathematics 121 and departmental permission. Credit as arranged. Messrs. Crowell and Juenker. Offered as occasion warrants.

265 THERMAL PHYSICS (3-0) Basic concepts of thermodynamics and introduction to kinetic theory and statistical mechanics. *Prerequisite:* 128 and mathematics 121. Three hours. Mr. Juenker.

271 ATOMIC AND NUCLEAR PHYSICS Phenomenological study of electronic structure of atoms. Development of quantum theory. Structure of the nucleus and properties of elementary particles. *Prerequisites:* 211. Three hours. Mr. Detenbeck.

272 INTRODUCTORY QUANTUM MECHANICS Introduction to non-relativistic quantum mechanics. Schroedinger equation and applications to simple systems. *Prerequisites:* 271 and 216. Three hours. Mr. Detenbeck.

Physiology and Biophysics

COLLEGE OF MEDICINE

Professors Alpert (Chairman), Chambers; Associate Professors McCrorey, Parsons, Webb; Assistant Professors Halpern, Hamrell, Gibbons, Whitehorn; Instructors MacDonald.

9-10 **INTEGRATED SCIENCE (4-2)** A Systems Approach to Biology. This course will provide a physical-chemical basis for an understanding of modern biology. Specific emphasis will be placed on the functioning of the various biological systems and the interrelationships among these systems. Time will be spent in discussing how the intact organism uses the systems for maintaining its own integrity and for withstanding the stresses of the environment. There will be a focus on the skeletal-neuro-muscular system; cardiovascular system; respiratory system; gastrointestinal system; endocrine system; nervous system, and the renal system and body fluids. Five hours per semester. Staff.

100 **PHYSIOLOGY AND BIOPHYSICS (4-2)** This course is taught as a science to physical therapy students in the first and second semesters, with emphasis placed on the broad physical, chemical and biological principles underlying the function of the main organ, tissue and subcellular systems. Special stress is placed on those phases which are the scientific basis of clinical physical therapy. The course consisting of 140 hours is made up of lectures, demonstrations and conferences. Five hours. Staff.

Plant and Soil Science

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professors Wiggins (Chairman), Bartlett, Hopp (Emeritus), and MacCollom; Associate Professors Benoit (Adjunct), Boyce, McIntosh, Parker, Pellett, and Wood; Assistant Professors Evert, Flanagan, and Varney; Adjunct Professor Calahan; Adjunct Associate Professor Benoit; Assistant Bruckel.

10 **HOME AND GARDEN HORTICULTURE** Planning, selecting, and maintaining shrubs, trees, flowers, lawns, fruits, and vegetables around the home. Designed primarily for non-agricultural students. Three hours. Mr. Wiggins and staff.

11 **PRINCIPLES OF PLANT SCIENCE** Principles and practices involved in the culture, management, and utilization of economically important horticultural and agronomic crops. Three hours. Mr. Boyce.

14 **SCIENTIFIC PHOTOGRAPHY** Introduction to scientific still photography for the student and researcher in the plant sciences. Two hours. Mr. Wood.

61 **INTRODUCTORY SOIL SCIENCE (2-3)** Introductory study of the nature and properties of soils and how they serve as a media for plant growth. *Prerequisite:* sophomore standing. Three hours. Mr. McIntosh.

99 **ENVIRONMENTAL QUALITY** (see p. 185).

102 **NATURAL RESOURCE CONSERVATION** Systematic appraisal of the nation's resources; including soil, water, atmosphere, forest, wildlife, and mineral. *Prerequisite:* junior standing. Three hours. Mr. Flanagan.

106 **ECONOMIC ENTOMOLOGY (3-2)** Survey of the major insect orders, and methods for controlling injurious species. *Prerequisite:* 11 and animal science 2. Four hours. Mr. MacCollom. Alternate years, 1972-73.

107 **FOREST ENTOMOLOGY (2-2)** Ecology and population dynamics of insects affecting forests and forest products. Insect control by silvicultural, biotic and chemical means. *Prerequisite:* junior standing in forestry or departmental permission. Three hours. Mr. Parker.

- 110 WATER POLLUTION HYDROLOGY (see page 185).
- 111 WORLD CROPS Effect of environment, nutrition, and management on crop growth, distribution and production of world food supplies. *Prerequisite:* 11 or Bot 4 or Biol 1 and 2. Three hours. Mr. Wood. Alternate years 1972-73.
- 122 SMALL FRUIT CROPS (2-3) Principles of small fruit production, including propagation, culture, management, and harvesting. *Prerequisite:* 11. Three hours. Mr. Boyce. Alternate years 1973-74.
- 125 ORNAMENTAL HORTICULTURE (2-3) Identification, climatic requirements, cultural management, and use of ornamental plant materials in landscape plantings. *Prerequisite:* 11. Three hours. Mr. Bruckel. Alternate years 1973-74.
- 138 PLANT PROPAGATION (2-4) Principles and practices involved in propagating herbaceous and woody plants by seeds, division, layering, cuttings, budding, grafting, and tissue culture. *Prerequisite:* 11 or consent of the instructor. Three hours. Mr. Evert.
- 145 TURFGRASSES (2-3) Establishment, maintenance and utilization of turf for lawns, parks, athletic fields, airports, cemeteries, roadsides, golf courses, and ski slopes. *Prerequisite:* 11. Three hours. Mr. Wood. Alternate years 1973-74.
- 162 SOIL FERTILITY AND MANAGEMENT Principles of soil management including soil testing methods and interpretations, fertilizer manufacture, usage, and management practices. *Prerequisite:* 61. Three hours. Mr. McIntosh.
- 191, 192, 193 UNDERGRADUATE SPECIAL TOPICS Lectures, laboratories, readings, field projects, surveys or research designed to provide specialized experience in horticulture, agronomy, soils, or plant environment. *Prerequisite:* permission of the department. One to three hours. Staff.
- 201 MICROMETEOROLOGY Theoretical and practical considerations of the micrometeorological factors that affect plant growth and agricultural practices. *Prerequisite:* 11 or equivalent. Three hours. Mr. Benoit. Alternate years, 1973-74.
- 204 PLANT RESEARCH TECHNIQUES (2-3) Methods of conducting research with plants including the organizing and planning of experiments. *Prerequisite:* 11, 61, and botany 104 or equivalent. Three hours. Mr. Wiggans. Alternate years, 1973-74.
- 205 MINERAL NUTRITION OF PLANTS Role of essential elements for plant growth including classical and modern approaches to the study of ion availability and transport. *Prerequisite:* botany 104 or equivalent. Three hours. Mr. Bartlett and botany, forestry, and plant and soil science staff. Alternate years, 1973-74.
- 207 WATER RELATIONS OF PLANTS (See forestry 207) Three hours. Mr. Donnelly and botany and plant and soil science staff. Alternate years, 1972-73.
- 222 ADVANCED TREE FRUIT CULTURE (2-3) Theory and practice of modern commercial fruit science. Nutrition and cultural responses to various management practices. *Prerequisite:* 11. Three hours. Mr. Calahan. Alternate years, 1972-73.
- 261 SOIL CLASSIFICATION AND LAND USE Classification of soils throughout the world as they relate to soil development and land use. Three Saturday field trips. *Prerequisite:* 61 or a total of six hours in ecology, geography, or geology. Three hours. Mr. Bartlett, Mr. Watson. Alternate years, 1972-73.

264 **SOIL CHEMISTRY (2-3)** Chemistry and biology of soils affecting plant growth including the properties of clays and organic matter. *Prerequisite:* 61, chemistry 1-2 or 11-12. Three hours. Mr. Bartlett. Alternate years, 1973-74.

266 **SOIL PHYSICS (2-3)** Mathematical and physical principles of the soil-water-plant interaction and its relationship to production and management. *Prerequisite:* 61, physics 5-6 or chemistry 1-2. Three hours. Mr. Benoit. Alternate years, 1972-73.

281 through 283 **SEMINAR** Presentation and discussion of papers on selected topics of current interest by students and staff. *Prerequisite:* senior standing. One hour. Staff.

Political Science

COLLEGE OF ARTS AND SCIENCES

Professors Dellin, Gould (Chairman), Haugen, Hilberg, Little, Nuquist and Staron; Associate Professors Parenti, Simon; Assistant Professors Brubaker, Flanders, Flannery, Pacy, Roth, Warner and Wertheimer; Adjunct Assistant Professor Eastman; Instructors Brewer and Nelson.

11, 12 **INTRODUCTION TO POLITICAL SCIENCE** First semester: elements of political science. Second semester: comparative governmental institutions. Three hours. Staff.

13 **INTRODUCTION TO POLITICAL THEORY** An introduction to empirical theories of politics, the purpose of normative theory, and the analysis of basic political concepts. Three hours. Mr. Wertheimer.

21 **AMERICAN POLITICAL SYSTEMS** Institutions, processes, and problems of American government. Three hours. Mr. Warner and staff.

51 **INTERNATIONAL RELATIONS** The state as actor in international relations. Global divisions and problems. Three hours. Messrs. Flannery, Hilberg, Little and Pacy.

71 **COMPARATIVE POLITICAL SYSTEMS** Introduction to the method and theories of Comparative Politics focusing upon selected contrasting political systems. Three hours. Mr. Flanders.

81 **POLITICAL BEHAVIOR** An analysis of how people react to political situations and the ways in which their behavior may be understood. Three hours. Mr. Nelson.

96 **SEMINAR** Selected topics in Political Science. Three hours. Staff.

161, 162 **LOCAL GOVERNMENT** First semester: governments of counties, towns, and other rural units. Second semester: municipal government. *Prerequisite:* six hours in political science; junior standing. Three hours. Mr. Nuquist.

171 **WESTERN EUROPEAN POLITICAL SYSTEMS** An examination of the British, German, and French political systems. Three hours. Mr. Staron.

172 **RUSSIAN AND EASTERN EUROPEAN POLITICAL SYSTEMS** An examination of

the Russian and some other Eastern European Communist political systems. Three hours. Mr. Staron.

173 CANADIAN AND COMMONWEALTH GOVERNMENTS Emphasis on Canada and Commonwealth cooperation. Three hours. Mr. Haugen.

174 LATIN AMERICAN POLITICAL SYSTEMS Analysis of the formal and informal political structure of Latin American states with emphasis upon contemporary developments. Three hours. Mr. Gould.

175, 176 ASIAN POLITICAL SYSTEMS The development of political institutions and processes in the 20th century with brief historical introductions. First semester: East Asia. Second semester: South and Southeast Asia. Three hours. Messrs. Little and Flanders.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

211, 212 HISTORY OF POLITICAL THOUGHT First semester: development of political thought from Plato to Burke. Second semester: recent political ideologies. *Prerequisite*: six hours in political science. Three hours. Mr. Staron.

213 CONTEMPORARY POLITICAL THOUGHT A discussion of the writings of several twentieth-century political thinkers, including writings in related fields such as psychology and economics. *Prerequisite*: six hours in political science. Three hours. Mr. Wertheimer.

214 THEORIES OF DEMOCRACY An examination of both empirical and normative theories of democracy. *Prerequisite*: six hours in political science. Three hours. Mr. Wertheimer.

216 AMERICAN POLITICAL THOUGHT American political thought from the colonial period to recent times. *Prerequisite*: six hours in political science. Three hours. Mr. Simon.

221, 222 CONSTITUTIONAL LAW First semester: judicial review, federalism, citizenship and suffrage, taxing power, commerce power. Second semester: Bill of Rights, Due Process, Equal Protection. *Prerequisite*: six hours in political science. Three hours. Mr. Gould.

224 LAW AND THE JUDICIAL PROCESS Approaches to the study of judicial behavior. Courts as a political process. *Prerequisites*: six hours of political science. Three hours. Mr. Brubaker.

226 ADMINISTRATIVE LAW A study of judicial decisions affecting the actions of public officials as they relate to the functions and policies of government. *Prerequisite*: six hours in political science. Three hours. Mr. Nuquist.

227, 228 INTERNATIONAL LAW Principles and applications of public international law. *Prerequisite*: six hours in political science. Three hours. Mr. Little.

231 THE LEGISLATIVE PROCESS Congressional and parliamentary organization and procedure. *Prerequisite*: six hours in political science. Three hours. Mr. Haugen.

232 LAWMAKING AND PUBLIC POLICY Influence of the executive and problems of congressional and parliamentary control. *Prerequisite*: six hours in political science. Three hours. Mr. Haugen.

233 THE NATIONAL EXECUTIVE Analysis of the functions and organization of the Presidency and the bureaucracy in American national government. *Prerequisite:* six hours in political science. Three hours. Mr. Warner.

235 DEFENSE POLICY Constitutional and historical framework; intelligence, R and D, procurement, manpower and deployment; U.S.-Soviet discrepancies, developments, and dilemmas. *Prerequisite:* six hours in political science. Three hours. Mr. Pacy.

239 AMERICAN POLITICS An examination of the politics of decision-making in the American political system. *Prerequisite:* six hours in political science. Three hours. Mr. Simon.

241 PUBLIC ADMINISTRATION The Federal government in action. *Prerequisite:* twelve hours in political science, or six hours in political science and one sophomore course in social science; junior standing. Three hours. Mr. Nuquist.

242 PROBLEMS OF PUBLIC MANAGEMENT Analysis of policy and administrative issues of current domestic programs. *Prerequisite:* six hours in political science. Three hours. Mr. Warner.

250 THE CRAFT OF DIPLOMACY Emphasis on experiences and reflections of diplomatic personalities, supplemented by studies of specialists. *Prerequisite:* six hours in political science. Three hours. Mr. Pacy.

251, 252 AMERICAN FOREIGN POLICY First semester: constitutional principles, institutional factors, and historic traditions in the formation of foreign policy. Second semester: contemporary policies toward specified countries. *Prerequisite:* six hours of political science. Three hours. Mr. Hilberg.

256 INTERNATIONAL ORGANIZATION Theory and practice in supranational institutions. *Prerequisite:* six hours in political science. Three hours. Mr. Pacy.

257 POLITICAL GEOGRAPHY See Geography 257. Three hours. Mr. Miles.

258 PROBLEMS OF COMMUNISM See Economics 258. Three hours. Mr. Dellin.

261 URBAN GOVERNMENT AND POLITICS An analysis of metropolitan areas in terms of their governments, problems and roles. *Prerequisite:* six hours of political science. Three hours. Mr. Brubaker.

263 STATE GOVERNMENT A comparative analysis of state governments in the United States. *Prerequisite:* six hours in political science. Three hours. Mr. Brubaker.

264 STATE ADMINISTRATION Problems in planning, policy development, and program coordination. *Prerequisite:* six hours in political science. Three hours. Mr. Haugen.

265 INTERGOVERNMENTAL RELATIONS Problems of the Federal system. National-state-local cooperative administration of selected public functions. *Prerequisite:* six hours in political science. Three hours. Mr. Haugen.

273 COMPARATIVE POLITICAL ANALYSIS An intensive examination of selected topics in comparative politics. *Prerequisite:* a semester course in Comparative Government. Three hours. Mr. Flanders.

277 SOVIET POLITICS See History 277. Three hours. Mr. Daniels.

278 FOREIGN POLICY OF THE USSR Emphasizing post 1960 developments. *Prerequisite:* junior standing or consent of instructor. Three hours. Mr. Flannery.

281 **POLITICAL PARTIES** Analysis of political parties with special emphasis upon voting behavior and campaign techniques. *Prerequisite:* six hours in political science. Three hours. Mr. Nelson.

282 **POLITICAL COMMUNICATION** Analysis of the development and mobilization of political attitudes with emphasis on public opinion and interest group activity. *Prerequisite:* six hours in political science. Three hours. Mr. Nelson.

283 **SCOPE AND METHODS OF POLITICAL SCIENCE** Approaches, sources of information, research methods and systematization in the study of political phenomena. Open to senior majors and graduate students only. Three hours. Mr. Wertheimer.

291 through 293 **READING AND RESEARCH** For advanced undergraduates and graduate students. Three hours. Staff.

295, 296 **SEMINAR** Selected topics in Political Science. *Prerequisite:* six hours in political science. Three hours. Staff.

Psychology

COLLEGE OF ARTS AND SCIENCES

Professors Albee, Ansbacher and Forays (Chairman); Associate Professors Burchard, Goldstein, Joffe, Lawson, Leitenberg, Patterson and Perrine; Assistant Professors Conquest, Does, Ferguson, Gordon, Hasazi, Howell, Huntley, Kapp, Kessler, Leff, McKenzie, Musty, Rodd and Rolf.

1 **GENERAL PSYCHOLOGY** Introduction to the entire field, emphasizing the normal adult human being. Three hours. Miss McGrath and Messrs. Huntley and Rolf.

5 **PSYCHOLOGICAL STATISTICS** Statistical technique and research design pertinent to the behavioral scientist. A calculation laboratory is provided. *Prerequisite:* 1. Three hours. Messrs. Howell and Gordon.

105 **CHILD PSYCHOLOGY** *Prerequisite:* 1. Three hours. Mr. Hasazi.

106 **PERSONALITY** Individual and life problems from the field-theoretical and phenomenological approach with emphasis on Alfred Adler's viewpoint. *Prerequisite:* 1. Three hours. Mr. Ansbacher.

108 **ABNORMAL PSYCHOLOGY** The more unusual mental processes; methods of observing them and interpreting them; their bearing on our understanding of the normal mind. *Prerequisite:* 1. Three hours. Mr. Kessler.

109 **EXPERIMENTAL PSYCHOLOGY I (2-4)** Problems of experimental design and methodology. Laboratory exercises involving data collection and analysis; development and completion of an original experiment. *Prerequisite:* 5. Four hours. Mr. Lawson.

110 **EXPERIMENTAL PSYCHOLOGY II (2-4)** Research using animals as subjects. *Prerequisite:* 109. Four hours. Mr. Joffe.

121 **SOCIAL PSYCHOLOGY** A psychological approach to social phenomena

with emphasis on the concepts and methods used in the study of the behavior of individuals in various social situations. *Prerequisite:* 1. Three hours. Mr. Leff.

123 **SYSTEMATIC PSYCHOLOGY** A comparative study of the leading contemporary schools of psychological thought. *Prerequisite:* 1. sophomore standing. Three hours. Miss Rodd.

193, 194 **COLLEGE HONORS**

195, 196 **SPECIAL TOPICS**

197, 198 **RESEARCH** Individual research under staff direction. *Prerequisite:* departmental permission. Three or six hours. Staff.

200 **BEHAVIOR MODIFICATION** A survey of techniques for the manipulation and control of human behavior, and evaluation of their effectiveness. *Prerequisite:* 1. Three hours. Messrs. Leitenberg and Burchard.

205 **BEHAVIOR DISORDERS OF CHILDHOOD** Covers a wide range of topics from brain damage to childhood psychoses and nightmares. Each problem behavior will be considered in the context of normal child development. *Prerequisite:* 1 and 105 or 108. Three hours. Mr. Rolf.

210 **COMPARATIVE PSYCHOLOGY** Behavior of animals under controlled experimental conditions and in their natural environments. Consideration of behavior similarities and differences at various levels of the phyletic scale. *Prerequisite:* 110, 123. Three hours. Staff.

221 **PHYSIOLOGICAL PSYCHOLOGY I** The structure and function of the mammalian nervous system, with emphasis upon neurological correlates of behavior and receptor mechanisms. Individual laboratory experience. *Prerequisite:* 110, 123. Mr. Patterson.

222 **PHYSIOLOGICAL PSYCHOLOGY II** The study of the role of central nervous system mechanisms in the determination of innate behavior, arousal, internal inhibition and learning. Individual laboratory experience. *Prerequisite:* 110, 123, 221. Mr. Musty.

228 **INTRODUCTION TO CLINICAL PSYCHOLOGY** This course is a study of the basic principles of interviewing, testing, assessment from life situations, and report writing. There is an examination of the most common approaches to psychotherapy, such as the client-centered, habit change, cognitive change, emotional change, interpersonal relations, and group therapy approaches. Three hours. Mr. Kessler.

230 **LEARNING** Basic laws of the learning process as revealed by controlled experiments. Laboratory experiences are provided and students may undertake original experiments. *Prerequisite:* 110, 123. Three hours. Mr. Howell.

232 **EXPERIMENTAL SOCIAL PSYCHOLOGY** Advanced survey covering current research in various fields of social psychology. *Prerequisite:* 110, 123. Three hours. Mr. Ferguson.

234 **MOTIVATION AND EMOTION** Nature and development of motives, emotions and their relation to other psychological processes. *Prerequisite:* 110, 123. Three hours. Mr. Joffe.

236 **THINKING** A critical review of the experimental investigation of thought processes. *Prerequisite:* 110 and 123. Three hours. Messrs. Gordon and Howell.

237 **SENSORY PERCEPTION** An introduction to the sensory basis of perception.

Emphasis is on methodology and research literature; development of an original experiment. *Prerequisite:* 110, 123. Three hours. Mr. Lawson.

238 SOCIAL PERCEPTION Experimental and theoretical study of the phenomena of the human perceptual process, with emphasis on the role of social, motivational, and learning factors. Students may undertake original experiments. *Prerequisite:* 110, 123. Three hours. Mr. Perrine.

281-282 SEMINAR Review and discussion of current psychological research. *Prerequisite:* 110, 123. One hour. Staff.

295, 296 CONTEMPORARY TOPICS *Prerequisite:* 110 or permission of the instructor. Three hours. Staff.

Radiologic Technology

SCHOOL OF ALLIED HEALTH SCIENCES

Professor VanBuskirk; Instructors Falby, Izzo; Adjunct Instructor Lacasse.

1, 2 CLINICAL ORIENTATION (2-4) Observation and participation in the clinical setting of the divisions of Nuclear Medicine, Radiation Therapy and Diagnostic Radiography of the Medical Center Hospital of Vermont combined with discussion groups and independent study. *Prerequisite:* enrollment in the radiologic technology program. Three hours each. Mr. Falby.

11, 12 INTRODUCTORY RADIOLOGIC SCIENCE Study of osteology, visceral anatomy, and medical terminology relative to diagnostic and therapeutic applications of radiation; introduction to basic principles of ionizing radiation, interaction of radiation with matter, biological effects of radiation, and protection methods for personnel and patients. *Prerequisite:* Physics 3 for RT 12. Three hours each. Dr. VanBuskirk, Mr. Izzo, Mr. Falby.

13 RADIOPATHOLOGY AND CLINICAL ONCOLOGY Study of pathological conditions and their manifestation by radiography and nuclear imaging. *Prerequisite:* RT 11. Three hours. Dr. VanBuskirk.

31 RADIOGRAPHIC SCIENCE Study of principles and methods of obtaining optimum radiographs, including topics of x-ray film and processing, intensifying screens, image formation and tomography. Three hours. Mr. Falby.

33, 34 RADIOGRAPHIC TECHNIQUES I, II Lecture and demonstration of techniques for accurate patient positioning to obtain optimum radiographic visualization includes special radiographic procedures and assignments in Emergency Room at Mary Fletcher Unit. *Prerequisite:* 33 for 34. Three hours, Four hours. Mr. Falby.

41, 42, 43 NUCLEAR MEDICINE TECHNOLOGY I, II, III Study of radiopharmaceuticals, instrumentation and clinical techniques for determination of pathology related to body structure and function. Three hours each. *Prerequisite:* RT 12. Mr. Izzo.

51, 52, 53 RADIATION THERAPY TECHNOLOGY I, II, III Study of physical principles and clinical techniques involved in the therapeutic use of ionizing radiation for malignant disease; including treatment planning, computer techniques. *Prerequisite:* RT 12. Three hours each. Staff.

71, 72 SENIOR CLINICAL PRACTICUM (0-12) Continuation of RT 1, 2 in field of specialization. Three hours each. Staff.

91, 92 SPECIAL RADIOLOGIC PROBLEMS Independent projects under the direction of faculty members. Variable hours. Staff.

Resource Economics

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professors Sargent (Chairman), Sinclair, Tremblay, and Webster; Assistant Professors Fife, Gilbert, and Schmidt; Adjunct Professor Houghaboom; Adjunct Associate Professor Eddy; and Adjunct Assistant Professor Bevins.

2 WORLD FOOD AND POPULATION Agricultural development with emphasis on natural and economic phenomena and the effect of food supplies on population trends and policies. Three hours. Mr. Tremblay.

51 AGRICULTURAL FINANCE Capital requirements of agriculture, financial problems of farmers, types and sources of credit, policies and practices of lending institutions. Alternate years, 1972-73. Three hours. Mr. Sinclair.

61 PRINCIPLES OF AGRICULTURAL AND RESOURCE ECONOMICS Introduction to principles of economics through the analysis of problems of agricultural production and resource development. *Prerequisite:* sophomore standing. Three hours. Mr. Sinclair.

75 PARTICIPATION IN RECREATION MANAGEMENT (see page 186).

121 RESOURCE ECONOMICS An evaluation of the economic forces affecting resource allocation, tools of economic analysis, and economic implications of current resource utilization practices. *Prerequisite:* economics 11 or resource economics 61. Three hours. Mr. Gilbert.

166 SMALL BUSINESS MANAGEMENT Theoretical and practical considerations in organizing and operating small businesses. Emphasis on financing, accounting, budgeting, investment analysis, and tax management. *Prerequisite:* sophomore standing. Three hours. Mr. Fife.

197, 198 SENIOR RESEARCH Work on a research problem under the direction of a staff member. Findings submitted in written form as prescribed by the department. *Prerequisite:* senior standing. Three hours. Staff.

201 FARM BUSINESS MANAGEMENT Organization and operation of successful farm businesses with emphasis on resource allocation, production efficiency, and marginal analysis. Field trips required. *Prerequisite:* economics 11, 12, or resource economics 61; junior standing. Three hours. Mr. Tremblay.

207 AGRICULTURAL MARKETING AND PRICES Market structure, prices, and economic forces involved in the movement of farm products from producers to consumers. *Prerequisite:* economics 11-12, or resource economics 61. Three hours. Mr. Webster.

208 AGRICULTURAL POLICY History and institutional development of agricultural policy. Price and income problems of American agriculture and alternative solutions. *Prerequisite:* economics 11-12, or resource economics 61. Alternate years, 1972-73. Three hours. Mr. Sinclair.

217 RURAL SOCIOLOGY (see page 244).

218 COMMUNITY ORGANIZATION AND DEVELOPMENT (see page 244).

222 ADVANCED RESOURCE ECONOMICS A critical investigation of current research, allocation procedures, and methods of analysis in natural resource economics with emphasis on the public sector. *Prerequisite:* resource economics 121. Three hours. Mr. Gilbert.

223 REGIONAL PLANNING Delineation of regional boundaries, determination of public goals, tools of planning, quality environment planning and the legal and political process of planning. *Prerequisite:* senior standing and economics 11, 12, or equivalent. Three hours. Mr. Sargent.

224 ENVIRONMENTAL POLICY The economic history, objectives, criteria, implementation, politics, and implications of natural resource policy. *Prerequisite:* junior standing and resource economics 121, or permission of the instructor. Three hours. Mr. Sargent.

225 ECONOMICS OF OUTDOOR RECREATION An economic analysis of demand and supply of natural resources for outdoor recreation. Emphasis on current policy issues and management of recreational business firms. *Prerequisite:* economics 11, 12, or resource economics 61. Three hours. Mr. Bevins.

254 ADVANCED AGRICULTURAL ECONOMICS Theories of supply and demand analysis, price determination, market structure, and income distribution in competitive and imperfectly competitive markets. *Prerequisite:* twelve hours in resource economics and/or economics, and senior standing. Three hours. Mr. Sinclair.

255, 256 SPECIAL TOPICS IN RESOURCE ECONOMICS Readings and discussion of selected topics in economics at an advanced level. *Prerequisite:* departmental permission. Credit as arranged. Staff.

266 ECONOMICS OF MANAGERIAL DECISIONS Applying economic concepts to problems of capital budgeting, tax planning, pricing, demand analysis, and discounting cash flows. Cases. *Prerequisite:* economics 11, 12, or equivalent. Three hours. Mr. Fife.

Romance Languages

COLLEGE OF ARTS AND SCIENCES

Professor Daggett; Associate Professors Kohler, Julow (Chairman), Parker and Ugalde; Assistant Professors Rivard, Wesseling, Whitebook, Willis, and Zdrate; Instructors Crichfield, Geno, Lehovich, Murad, Nunez-de-Cela, and Wiley.

French and Spanish language and literature courses are listed separately below by title and number. The language sequences are designed specifically to train students in the four skills of speaking, comprehension, reading, and writing. The total sequence in each language represents a continuum into which a student with previous experience in the language will be placed according to his level of achievement, regardless of how many or how few years he may have studied it. For placement in advanced language courses (100 or above), first-year students should

consult with this department. Those who have already taken courses here should simply follow the levels represented by the number sequences, 1-99, 100-199, etc. For convenience, we offer the following guidelines for placement in elementary and intermediate; in all cases of doubt students should seek the advice of this department:

ELEMENTARY LANGUAGE: no previous study or less than two years of high school language.

INTERMEDIATE GRAMMAR: two to three years.

INTERMEDIATE READING AND CONVERSATION: three or more years.

Course titles and numbers:

French Language

1-2 ELEMENTARY Eight hours.

19 INTERMEDIATE GRAMMAR Four hours.

51, 52 INTERMEDIATE READING AND CONVERSATION Three hours.

119 ADVANCED GRAMMAR Three hours.

121, 122 COMPOSITION AND CONVERSATION Three hours.

223, 224 ADVANCED COMPOSITION AND CONVERSATION Three hours.

233, 234 EXPLICATION DE TEXTES, STYLISTICS Three hours (each course).

227, 228 LINGUISTIC STRUCTURE OF FRENCH Open to all students who have completed at least 122 and required of those who wish to be recommended to teach. Three hours. (each course). Mr. Willis.

Spanish Language

1-2 ELEMENTARY Eight hours.

19 INTERMEDIATE GRAMMAR Four hours.

51, 52 INTERMEDIATE READING AND CONVERSATION Three hours. (each course)

119 ADVANCED GRAMMAR Three hours.

121, 122 COMPOSITION AND CONVERSATION Three hours. (each course)

223, 224 ADVANCED COMPOSITION AND CONVERSATION Three hours. (each course)

Literature Courses in French and Spanish

As the language courses offer a continuum for the learning of the four skills, the literature courses provide a sequential study of the development of French and Spanish literatures from the Middle Ages to the present. In addition, they offer both practice and continued training in the four language skills. While the literature courses are divided into centuries, with subcategories of genres, themes, and individual authors, it is not essential to adhere strictly to chronological order. *In general, a one-hundred level literature course or its equivalent is the prerequisite for all other literature courses; exceptions are regularly made with the approval of the department.* Questions about the precise content of any

literature course should be referred to the instructor listed for the course or to the department chairman.

Course titles and numbers:

French Literature

151, 152 MASTERWORKS *Prerequisite:* Intermediate French or equivalent. Three hours. (each course). Mr. Daggett and Staff.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

251 MEDIEVAL Three hours. Mr. Daggett. Alternate years, 1972-73.

256 16th CENTURY Three hours. Mr. Daggett. Alternate years, 1972-73.

261 THE BAROQUE AGE 1600-1650. Three hours. Mr. Parker. Alternate years, 1972-73.

262 17th CENTURY 1650-1700. Three hours. Mr. Julow. Alternate years, 1972-73.

267, 268 18th CENTURY Three hours. (each course). Staff. Alternate years, 1973-74.

271, 272 19th CENTURY POETRY Three hours. (each course). Mr. Crichfield and Staff. Alternate years, 1973-74.

273, 274 19th CENTURY NOVEL Three hours. (each course). Mr. Julow and Staff. Alternate years, 1973-74.

275 19th CENTURY THEATER Three hours. Staff. Alternate years, 1973-74.

281 20th CENTURY POETRY Three hours. Mr. Parker. Alternate years, 1972-73.

283, 284 20th CENTURY NOVEL Three hours. (each course). Staff.

285, 286 20th CENTURY THEATER Three hours. (each course). Mr. Geno and Staff. Alternate years, 1972-73.

287, 288 FRENCH-CANADIAN LITERATURE Three hours. (each course). Mr. Rivard.

291 SENIOR SEMINAR Special readings and research. Required of all senior majors. Two hours. Staff.

Spanish Literature

151, 152 MASTERWORKS OF SPAIN *Prerequisite:* Intermediate Spanish or equivalent. Three hours. (each course). Mr. Wesseling. Alternate years 1972-73.

161 READINGS IN SPANISH AMERICAN LITERATURE: 19th CENTURY *Prerequisite:* Intermediate Spanish or equivalent. Three hours. Mr. Zárate. Alternate years, 1973-74.

162 READINGS IN SPANISH AMERICAN LITERATURE: 20th CENTURY *Prerequisite:* Intermediate Spanish or equivalent. Three hours. Mr. Zárate.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

261, 262 GOLDEN AGE Three hours. (each course). Mr. Núñez-de-Cela. Alternate years, 1972-73.

263, 264 CERVANTES Three hours. (each course). Mr. Núñez-de-Cela. Alternate years, 1973-74.

271, 272 SPANISH-AMERICAN LITERATURE OF SOCIAL PROTEST Three hours. (each course). Mr. Zárate. Alternate years, 1972-73.

281 19th CENTURY Three hours. Mr. Ugalde. Alternate years, 1973-74.

282 20th CENTURY Three hours. Mr. Ugalde. Alternate years, 1973-74.

291 SENIOR SEMINAR Special readings and research. Required of all senior majors. Two hours. Staff.

The following extra-departmental course may be taken for credit toward a major in the Department of Romance Languages:

LINGUISTICS 101, 102 An introductory course designed to acquaint the student with the methods and theory of systematic observation and explanation of language phenomena (linguistics.) *Prerequisite:* 101 for 102. Three hours.

FOR GRADUATE COURSES (300 LEVEL), PLEASE SEE GRADUATE COLLEGE BULLETIN.

Russian

COLLEGE OF ARTS AND SCIENCES

Professor Paganuzzi; Assistant Professor Nalibow.

1-2 ELEMENTARY RUSSIAN Four hours.

11, 12 INTERMEDIATE RUSSIAN Rapid and systematic review of basic Russian. Increased stress on pronunciation, conversation, and reading. Readings in works by Pushkin, Lermontov, Tolstoi, Chekov, and others. *Prerequisite:* 1-2. Three hours.

101, 102 INTRODUCTION TO RUSSIAN LITERATURE Outstanding authors of the nineteenth and twentieth centuries, from Pushkin to Pasternak and Solzenitzin. Oral discussion of readings; written practice. *Prerequisite:* 11, 12. Three hours.

103, 104 ADVANCED RUSSIAN *Prerequisite:* 101, 102. Three hours.

281, 282 SEMINAR IN SLAVIC LINGUISTICS Discussion of the linguistic relationships of the slavic languages to one another and particularly to Russian. The structured development in history of contemporary standard Russian will be examined on the basis of historical and comparative linguistics. Three hours. (each course). Mr. Nalibow.

Sociology

COLLEGE OF ARTS AND SCIENCES

Professor Lewis; Associate Professors Folta, Mabry, Stanfield, Steffenhagen; Assistant Professors Deck, Nixon, Schmidt; Instructors Bradshaw, Fishman, Godfrey.

22 PRINCIPLES OF SOCIOLOGY The structure and dynamics of human groups. Three hours. Staff.

111 POPULATION, ENVIRONMENT, AND SOCIETY Analysis of the social consequences of the varying balance among population size, resource base, technology, and social organization. *Prerequisite:* 22. Three hours. Mr. Godfrey.

112 THE COMMUNITY Analysis of the structure and function of communities as social systems with emphasis on American communities. *Prerequisite:* 22. Three hours. Mr. Lewis.

141 SOCIAL PROBLEMS *Prerequisite:* 22. Three hours. Staff.

151 THE FAMILY A cross-cultural approach to the study of the family as a social institution. *Prerequisite:* 22. Three hours. Mr. Lewis.

154 MINORITY GROUPS *Prerequisite:* 22. Three hours. Mrs. Fishman.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 READINGS AND RESEARCH

205 SMALL GROUP DYNAMICS An analysis of the problems and the functioning of small groups and their relationship to large organizations. *Prerequisite:* six hours of sociology. Three hours. Mr. Nixon, Mr. Steffenhagen.

210 DEMOGRAPHY Analysis of factors affecting population growth and distribution, migration patterns, and the relationship between economic activity and population trends. *Prerequisite:* six hours of sociology. Three hours. Mr. Godfrey.

213 URBAN SOCIOLOGY The place of the city in social organization. *Prerequisite:* six hours of sociology. Three hours. Staff.

214 PUBLIC OPINION Analysis of opinion and attitude formation with the primary emphasis on the political sphere. *Prerequisite:* six hours of sociology. Three hours. Mr. Nixon.

217 RURAL SOCIOLOGY The nature of rural social structures in the context of modernization and change. *Prerequisite:* 22 and 112. Three hours. Mr. Schmidt.

218 COMMUNITY ORGANIZATION AND DEVELOPMENT Community as a changing complex of organization, and alternative strategies for change. *Prerequisite:* 22 and 112. Three hours. Mr. Schmidt.

221 CULTURE AND PERSONALITY (See Anthropology 221).

242 SOCIAL MOVEMENTS A study of social movements with special emphasis on revolutions. *Prerequisite:* 22 and 141. Three hours. Mr. Stanfield.

243 SOCIAL STRATIFICATION A comprehensive study of the various ways in

which societies become stratified into social class and caste, or open and closed social systems. *Prerequisite:* six hours of sociology. Three hours. Mr. Nixon.

245 **POLITICAL SOCIOLOGY** The interrelation between politics and the wider social context. *Prerequisite:* 22 and six additional hours of sociology. Three hours. Mr. Nixon.

248 **SOCIOLOGY OF WORK** The social nature of work in industrial society. *Prerequisite:* 22 and six additional hours of sociology. Three hours. Mr. Bradshaw.

250 **METHODOLOGY OF SOCIAL RESEARCH** *Prerequisite:* six hours of sociology. Three hours. Mr. Godfrey.

251 **SOCIAL RESEARCH METHODS** *Prerequisite:* 250. Three hours. Mr. Godfrey.

255 **THE DEVELOPMENT OF SOCIOLOGICAL THEORY** *Prerequisite:* 22. Three hours. Mr. Schmidt.

257 **CONTEMPORARY SOCIOLOGICAL THEORY** *Prerequisite:* 255. Three hours. Staff.

261 **DELINQUENCY** *Prerequisite:* six hours of sociology. Three hours. Mrs. Fishman, Mr. Stanfield.

262 **CRIME** *Prerequisite:* six hours of sociology. Three hours. Mrs. Fishman, Mr. Stanfield.

265 **CRIMINAL JUSTICE** Law enforcement and the courts. *Prerequisite:* six hours of sociology. Three hours. Mrs. Fishman, Mr. Stanfield.

266 **CORRECTIONS** Probation, prisons, parole, programs of prevention and rehabilitation. *Prerequisite:* six hours of sociology. Three hours. Mrs. Fishman, Mr. Stanfield.

270 **HEALTH AND MEDICINE** The social and cultural environment of illness and its influence on definition and treatment. *Prerequisite:* nine hours of sociology. Three hours. Mr. Steffenhagen and Mr. Mabry.

271 **SOCIOLOGY OF MENTAL HEALTH** The influence of a socio-cultural environment upon the perception and definition of mental health and illness. *Prerequisite:* nine hours in sociology. Three hours. Mr. Steffenhagen.

281, 282 **SEMINAR** Readings in current sociological literature. *Prerequisite:* twelve hours of sociology, senior standing, and departmental permission. Three hours. Staff.

Students interested in courses on social work should consult the offerings of the Social Welfare Program in the Department of Home Economics.



COLLEGE OF TECHNOLOGY

The College of Technology offers the following courses on a non-departmental basis.

7 **MAN'S PLACE IN THE UNIVERSE (1-0)** Philosophy has been, over the years, mainly concerned with the problems of understanding man; his activities, his beliefs, his relationship to his fellows and his significance in the larger universe. This course endeavors to integrate and interpret existing scientific data to make comprehensible these areas of human concern. The guiding principle is that all life must conform to the requirements of Darwin's Theory of Natural Selection and be consistent with the world's known evolutionary history. Topics include: theories of the development of the universe, nature's technique of design-by-chance, a scientific critique of religion and philosophy, the evolutionary basis of human and animal psychology and behavior, the genetic code and double-helix, the survival benefits of the religious impulse. The course will be presented in non-technical language for persons interested in practical philosophy. One hour. Mr. Rush.

51 **TECHNOLOGY AND SOCIETY (3-0)** An examination of the effects of modern technology on society. Non-technological views as well as those of engineers and scientists are presented. Readings from the current literature. Group study projects. *Prerequisite:* Sophomore standing. Three hours.

52 **TECHNOLOGY AND THE ENVIRONMENT (3-0)** Practical information on solving environmental problems with emphasis on pollution. Inter-relationships and control of land, air, and water environments. Lectures supplemented by discussion and field trips. *Prerequisite:* One semester of college chemistry or permission of the instructor. Three hours.

V Vocational Education and Technology

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

Professor Schneider; Associate Professor Fuller (Chairman); Assistant Professors Kelly, Malone, Purvis; Instructor Hull. Adjunct Faculty: Professor Tessman; Associate Professor Bornstein; Assistant Professors Halloran, Kisko, Moore.

General

5 **INTRODUCTORY AGRICULTURAL ENGINEERING (2-2)** Introduction to building, wiring, water supply, sewage disposal, soil and water engineering, mechanical principles, and engines for residential, recreational and farm use with environmental considerations. Not for credit for B.S.A.E. degree candidates. Three hours. Mr. Schneider.

102 **GENERAL SHOP (0-6)** Wood and metal working by hand and machine, sheet metal, welding, rope, and tool fitting. Shop layout, selection of equipment. *Prerequisite:* sophomore standing. Three hours. Mr. Schneider.

104 **LEADERSHIP PREPARATION** Group and independent study and practice of methods for teachers, officers, administrators and group members to increase their leadership ability. *Prerequisite:* Junior standing or departmental permission. Three hours. Mr. Fuller.

106 **UNDERSTANDING THE MENTALLY RETARDED** Survey of nature and needs of the mentally retarded. Field trips to, and discussions with personnel from, agencies and institutions serving the handicapped. Variable credit: 1 hour for field trips, 2 hours for lectures and discussions, 3 hours for combination. Mr. Hull.

112 **EXTENSION AND COMMUNITY EDUCATION** Introduction to community educational programs and techniques. Includes field trips and independent study. *Prerequisite:* sophomore standing. Two hours. Mr. Kelly.

152 **INTRODUCTION TO CAREER ORIENTED EDUCATION** Orientation to career education, and principles and philosophy of occupational and practical arts education. Includes field trips and independent study. *Prerequisites:* sophomore standing. Three hours. Mr. Fuller.

156 **DEVELOPING INSTRUCTIONAL MATERIALS FOR TEACHING** For students who will have educational program responsibilities in business, government, or schools. Materials will be prepared for auto-tutorial devices, audio-visual presentations, and other teaching techniques. *Prerequisite:* sophomore standing. Three hours. Mr. Kelly. Alternate years, 1973-74.

253 **TEACHING ADULTS** Problems related to organizing and planning adult education programs for schools, community organizations, government agencies or business. Techniques for teaching adults will be analyzed. *Prerequisites:* senior standing. Three hours. Mr. Kelly.

273 **TECHNICAL REPORTING** Designed for future and present scientists, engineers, and economists who are not professional writers but must learn to prepare written reports. Study and practice in communication of information through research and technical operations reports and articles in professional journals. Three hours. Mrs. Malone, Mr. Spaven.

273 **TECHNICAL REPORTING** Communication of information through research and technical reports and professional articles for scientists, engineers and economists. Three hours. Mrs. Malone, Mr. Spaven.

Applied Technology and Agricultural Engineering

121 **SOIL AND WATER MANAGEMENT (2-2)** Analysis of agricultural, recreational, and other rural soil and water problems; design and application of conservation practices for environmental protection. *Prerequisite:* plant and soil science 61; civil engineering 12 desirable. Three hours. Alternate years, 1972-73. Mr. Bornstein.

131 **RESIDENTIAL, RECREATIONAL AND AGRICULTURAL BUILDINGS (2-2)** Site planning, building planning, material selection. Functional and structural considerations including heating, ventilation and insulation. Consideration of environmental relationships. *Prerequisite:* sophomore standing. Three hours. Alternate years, 1973-74. Mr. Moore.

140 **POWER AND MACHINERY FOR AGRICULTURE (2-2)** The principles of operation and maintenance of engines, tractors and agricultural field and farmstead machinery. *Prerequisite:* physics 6. Three hours. Alternate years, 1973-74. Staff.

145 **SOIL AND WATER ENGINEERING (2-2)** Hydrologic, hydraulic, and agronomic principles; design and installation of drainage and irrigation systems, erosion control facilities, farm and small watershed flood control reservoirs, and other rural environmental protection practices. *Prerequisite:* plant and soil science 61, civil engineering 12. Three hours. Mr. Bornstein. Alternate years, 1973-74.

162 **ELECTRICITY, WATER SYSTEMS, AND SEWAGE DISPOSAL IN RESIDENTIAL, RECREATIONAL AND AGRICULTURAL USE** Wiring systems and applications of electricity, water sources and systems, sewage disposal for agriculture, residences,

recreation, and rural development with environmental considerations. *Prerequisite:* sophomore standing. Three hours. Alternate years, 1972-73. Mr. Moore.

Occupational and Extension Education

150 **TECHNICAL INTERNSHIP** Planned, supervised, off-campus educational internship during summers and/or junior year. Technical theory plus practical application in field experiences. A student may enroll more than one time and accumulate up to 30 hours credit. *Prerequisite:* Departmental permission. Credit as arranged. Staff. I, II.

153-154 **TEACHING INTERNSHIP IN OCCUPATIONAL EDUCATION** Seminars for newly employed teachers of occupationally oriented subjects plus two consecutive semesters of supervised teaching. *Prerequisites:* Employment as a teacher, a teaching methods course or concurrent enrollment, and departmental permission. Four hours each. Staff.

155 **TEACHING PRACTICUM IN OCCUPATIONAL EDUCATION** Ten full weeks of supervised teaching in a high school or junior college; including two weeks during opening of school year. *Prerequisites:* 152, concurrent enrollment in 251; acceptance into teacher education program. Eight hours. Staff.

157 **ORGANIZING AND MANAGING OCCUPATIONAL EDUCATION LABORATORIES** Study of the vocational-technical laboratory as a teaching and learning environment. Includes: purchasing, inventory control, equipment placement, maintenance, and safety. Three hours. Mr. Kisko.

158 **EVALUATING ACHIEVEMENT IN OCCUPATIONALLY ORIENTED EDUCATION** Introduction to evaluation techniques for occupational and technical subjects. Includes: test construction, teacher-made tests, and statistical analysis of scores. *Prerequisites:* A teaching methods course or concurrent enrollment, or departmental permission. Three hours. Mr. Purvis.

159 **DEVELOPING COURSES FOR OCCUPATIONAL EDUCATION** Systematic development of course materials used in teaching occupationally oriented subjects. Includes: occupational analysis, performance objectives, course content, and supplementary instructional materials. *Prerequisites:* A teaching methods course or concurrent enrollment, or departmental permission. Three hours. Mr. Purvis.

251 **METHODS FOR TEACHING OCCUPATIONALLY ORIENTED SUBJECTS** Advanced teaching techniques combined with micro-teaching. Emphasis placed upon teaching and program management at high school or junior college level. *Prerequisites:* Concurrent enrollment in 153 or 155, or departmental permission. Three hours. Mr. Fuller, Mr. Purvis, Mr. Kisko.

282 **SEMINAR** Follow-up of teaching practicum. Required for all students completing 155. *Prerequisite:* 155. One hour. Staff.

Independent Study and Research

197 **SPECIAL PROBLEMS** Individual investigation of a problem selected to meet special needs of students. Students may enroll more than one time and accumulate up to six hours. *Prerequisites:* Departmental permission. Credit as arranged. Staff. I, II.

295 **SPECIAL TOPICS** Lectures, laboratories and/or readings and reports to

provide background and specialized knowledge relating to contemporary areas of study. Students may enroll more than one time and accumulate up to nine hours. *Prerequisites:* senior standing, departmental premission. Credit as arranged. Staff, I, II.

Zoology

COLLEGE OF ARTS AND SCIENCES

Professors Glade (Chairman), Bell, Henson, Lochhead, Moody, Potash and Rothstein; Associate Professors Davison and Stevens; Assistant Professors Brammer, Keen, Landesman, and Woods.

Biology

1, 2 **PRINCIPLES OF BIOLOGY (3-3)** Introduction to the structure, functions, and evolution of animals and plants. Emphasis on concepts important for advanced study in a Life Science and for understanding the biological world of which man is a part. *Prerequisite:* 1 for 2. Four hours. Botany and Zoology staffs.

3 **BIOLOGY AND MAN** An introduction for nonscience majors. Selected biological processes relevant to man and his world, problems resulting from man's interaction with his environment such as overpopulation and environmental pollution, biological principles and concepts necessary for an understanding of these problems. *No prerequisite:* Three hours. Botany and Zoology staffs.¹

Zoology

5-6 **HUMAN ANATOMY AND PHYSIOLOGY (2-2)** Dissection of the cat, plus various vertebrate organs, with direct comparisons to corresponding structure in the human body; physiological experiments; microscopic study of tissues. Three hours. Mr. Brammer.²

101 **GENETICS** Structural basis of inheritance; gene mutations; chromosomal aberrations; genes and enzymes; gene action in differentiation; genetics of populations; nonchromosomal inheritance. *Prerequisite:* Biology 1, 2. Three hours. Mr. Moody.

102 **ENVIRONMENTAL ZOOLOGY (3-3)** Dynamics of populations; behavior; conservation of environmental and animal resources; principles of systematics. *Prerequisite:* Biology 1, 2. Four hours. Mr. Keen.

1. Credit will not be given for both Biology 1 and Botany 4. Credit will not be given for both Biology 1, 2 and Biology 3. Botany and Zoology majors will not receive credit for Biology 3.
2. May be taken for credit in the College of Arts and Sciences but does not satisfy the requirement of a course in biology for premedical and pre dental students. Students will not receive credit for both this course and zoology 103 and 104.

103 GENERAL STRUCTURE AND FUNCTIONS (3-3) Structure and physiology of cells, with emphasis on basic features common to all forms of life. *Prerequisite:* Biology 1, 2. Four hours. Mr. Landesman.

104 COMPARATIVE STRUCTURE AND FUNCTION (3-3) The ways in which diverse animal types deal with such processes as reproduction, locomotion, and metabolism. *Prerequisite:* 103. Four hours. Mr. Stevens and staff.

105 GENETICS LABORATORY (0-3) Illustration of concepts presented in Zoology 101. *Prerequisites:* 101 or concurrent enrollment and permission of the instructor. One hour. Mr. Glade.

193, 194 COLLEGE HONORS

195, 196 SPECIAL TOPICS

197, 198 UNDERGRADUATE RESEARCH Individual laboratory research under the guidance of a faculty member. Undergraduates who meet the academic requirements may enroll concurrently in College Honors. *Prerequisite:* junior or senior standing and departmental permission. Three hours or six hours.

201 CONTROL OF GROWTH AND DIFFERENTIATION Three hours. *Prerequisites:* 101, 211, and Chemistry 131, 132. Mr. Davison. Alternate years, 1973-74.

203 POPULATION ECOLOGY Dynamics, composition, and density regulation of animal populations. *Prerequisite:* 102. Three hours. Mr. Keen.

205 NATURAL HISTORY OF BIRDS AND MAMMALS (2-4) History, identification, evolution, ecology, behavior, zoogeography, conservation and aesthetics. *Prerequisite:* 102 or 104. Four hours. Mr. Woods. Alternate years, 1973-74.

207 NATURAL HISTORY OF THE LOWER VERTEBRATES (3-3) Classification, ecology, behavior, evolution, and distribution of fish, amphibians, and reptiles. *Prerequisite:* 104. Four hours. Mr. Bell. Alternate years, 1972-73.

208 GENERAL ENTOMOLOGY (2-4) Morphology, physiology, and evolution of insects. *Prerequisite:* 102 or 103. Four hours. Mr. Bell. Alternate years, 1973-74.

209 FIELD ZOOLOGY (2-4) Collection and identification; study of local habitats, their nature, and adaptations to them; factors governing distribution methods of preparing study specimens. *Prerequisite:* 102 or 103. Four hours. Mr. Bell.

211 EMBRYOLOGY (2-4) Principles exemplified by typical invertebrate and vertebrate embryos. *Prerequisite:* 104. Four hours. Mr. Glade.

212 COMPARATIVE HISTOLOGY (2-4) Anatomy of tissues, chiefly vertebrate. Tissue similarities and specializations of organs among the various groups of animals in relation to function. *Prerequisite:* 104. Four hours. Mr. Glade.

216 HUMAN GENETICS Inheritance; population genetics; interaction of heredity and environment; application to human problems. *Prerequisite:* 101. Three hours. Mr. Moody. Alternate years, 1972-73.

219 COMPARATIVE VERTEBRATE ANATOMY (2-4) Structure, function, and phylogeny; survey of evolutionary and functional trends; investigation of the structure of all chordate groups. *Prerequisite:* 104. Four hours. Mr. Woods.

220 MECHANISMS OF CELL DIVISION Fine structure and physiology of normal and abnormal cell division; emphasis on mechanisms. *Prerequisite:* 103, a course in biochemistry, and the consent of the instructor. Three hours. Mr. Stevens. Alternate years, 1973-74.

222 **EXPERIMENTAL EMBRYOLOGY (2-6)** Theoretical approach based on research in embryology, genetics, physiology, bacteriology, and related fields. *Prerequisite:* 211 and departmental permission. Four hours. Mr. Glade. Alternate years, 1973-74.

223 **BIOCHEMICAL EMBRYOLOGY** Inter- and intracellular processes during oogenesis and embryogenesis of selected organisms, biochemical and structural differentiation of cells and tissues. *Prerequisite:* 101, 211, and consent of the instructor. A course in biochemistry is recommended. Three hours. Mr. Landesman. Alternate years, 1972-73.

225 **ENVIRONMENTAL PHYSIOLOGY (2-4)** Processes by which animals cope with moderate, changing, and extreme environments. *Prerequisite:* 102 and 104. Four hours. Mr. Woods. Alternate years, 1973-74.

231 **CELL PHYSIOLOGY (2-4)** Experimental techniques used to elucidate chemical and physical mechanisms within living cells. *Prerequisite:* 103, chemistry 131, 132, and departmental permission. Four hours. Mr. Rothstein.

236 **FRESH-WATER BIOLOGY (2-4)** Aquatic environments and adaptations of organisms to varying physical, chemical and biotic conditions. *Prerequisite:* 102 and inorganic chemistry. Four hours. Mr. Henson.

250 **INVERTEBRATE ZOOLOGY (2-4)** Anatomy, physiology, and life histories of representatives of the more important phyla. *Prerequisite:* 104. Four hours. Mr. Lochhead.

251 **INSECT STRUCTURE AND FUNCTION (3-3)** Anatomy and physiology with emphasis upon growth, reproduction, and sensory physiology. *Prerequisite:* 104 or consent of instructor. Four hours. Mr. Brammer. Alternate years, 1972-73.

255 **COMPARATIVE ANIMAL PHYSIOLOGY (2-6)** General principles of function in invertebrates and vertebrates. *Prerequisite:* 104, departmental permission and Chemistry 131, 132. Four hours. II. Mr. Rothstein.

267 **GENETICS OF DEVELOPMENT (2-4)** Differentiation and morphogenesis from the viewpoint of gene action and biosynthesis; influence of hereditary material during ontogeny. *Prerequisite:* 101, 104, and departmental permission. Four hours. Staff. Alternate years, 1973-74.

270 **MODERN EVOLUTIONARY THEORY** Contributions of modern research in genetics, systematics, distribution, experimental embryology, serology, and related fields to problems of evolutionary change. *Prerequisite:* 101, (102 recommended). Three hours. Mr. Moody. Alternate years, 1973-74.

271 **ADVANCED LIMNOLOGY** Analyses of current concepts and problems. *Prerequisite:* 236. Four hours. Mr. Henson.

281 through 283 **SEMINAR** Review and discussion of current zoological research. Graduate students and seniors in zoological research programs are expected to enroll each semester. Without credit. Staff.

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V Academic Calendar

FALL SEMESTER

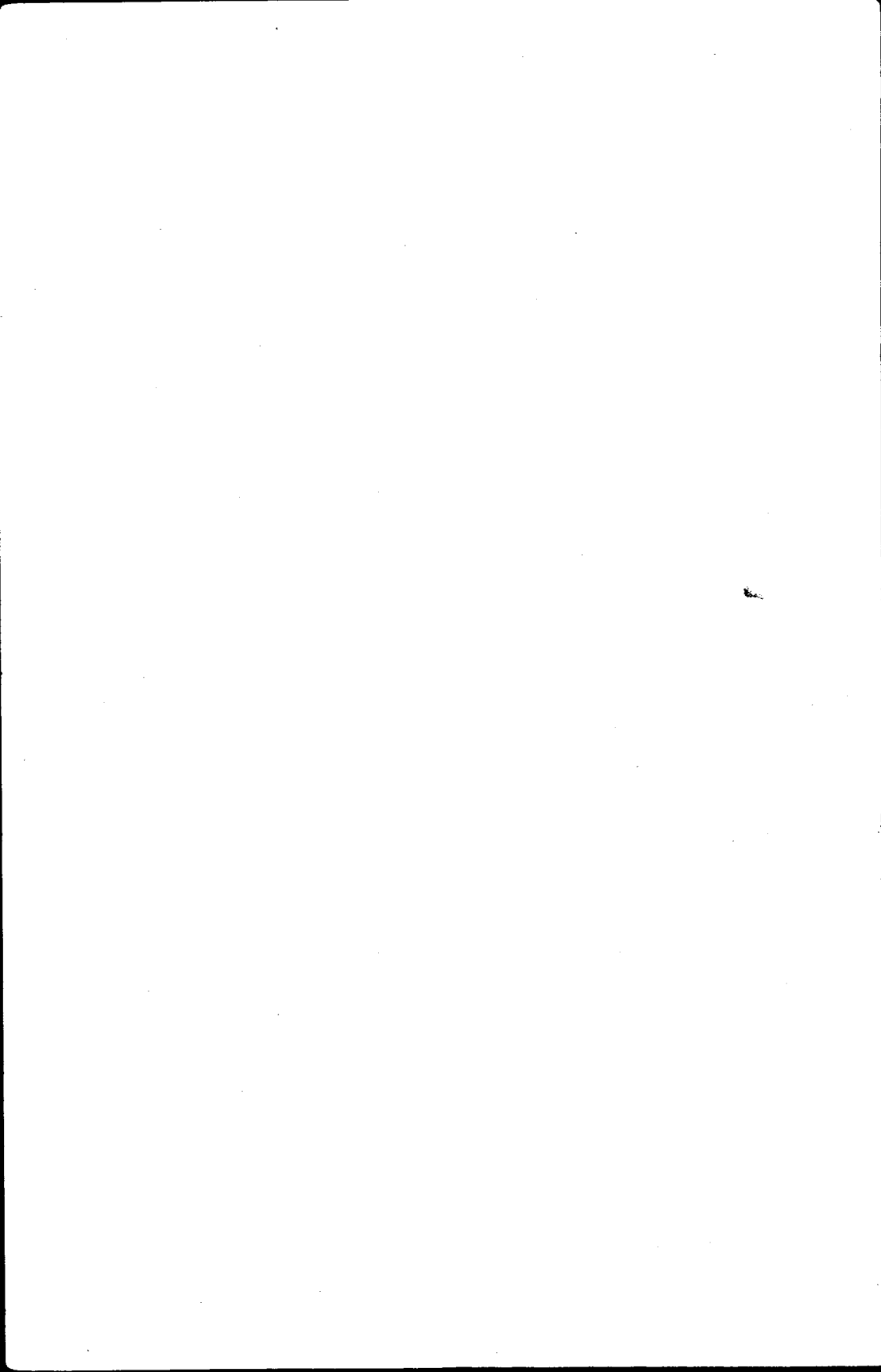
1971-1972

1972-1973

Registration	Aug. 31, Tues.-Sept. 1, Wed.	Sept. 5-6, Tues.-Wed.
Classes Begin	Sept. 2, Thursday	Sept. 7, Thursday
Labor Day, no classes	Sept. 6, Monday	
Columbus Day Recess	Oct. 9-11, Sat.-Mon.	Oct. 7-9, Sat.-Mon.
Grade Reports	Oct. 23, Saturday	Oct. 28, Saturday
Enrollment	Oct. 25, Mon.-Nov. 12, Fri.	Oct. 30-Nov. 3, Mon.-Fri.
Thanksgiving Recess	Nov. 24 (noon)-27, Wed.-Sat.	Nov. 22 (noon)-25, Wed.-Sat.
Classes End	Dec. 11, Saturday	Dec. 16, Saturday
Examinations Begin	Dec. 15, Wednesday	Dec. 18, Monday
Examinations End	Dec. 21, Tuesday	Dec. 23, Saturday

SPRING SEMESTER

Registration	Jan. 17-18, Mon.-Tues.	Jan. 15-16, Mon.-Tues.
Classes Begin	Jan. 19, Wednesday	Jan. 17, Wednesday
Winter Festival Recess	Feb. 18-19, Fri.-Sat.	Feb. 16-17, Fri.-Sat.
Grade Reports	Mar. 4, Saturday	Mar. 3, Saturday
Enrollment	Mar. 20-24, Mon.-Fri.	
	Apr. 3, Mon.-Apr. 14, Fri.	Mar. 19-23, Mon.-Fri.
Spring Recess Begins	Mar. 27, Monday	Mar. 26, Monday
Classes Resume	April 3, Monday	April 2, Monday
Honors Day	April 19, Wednesday	April 18, Wednesday
Classes End	May 6, Saturday	May 5, Saturday
Examinations Begin	May 10, Wednesday	May 9, Wednesday
Examinations End	May 16, Tuesday	May 15, Tuesday
Commencement	May 21, Sunday	May 20, Sunday



tal right is denied. Never is this duty more imperative than in those unhappy times when the public opinion of the community would restrain or curtail the free play of ideas. The universities, whose roots extend back into the centuries, have a tradition and a duty to maintain an independence of judgment in the face of public emotion.

While the universities must be sensitive to the needs of the community and nation, they need not and should not abrogate their position of leadership. This duty of the institution has never been so well stated as by Thomas Jefferson in his letter to prospective faculty members at the University of Virginia: "For here we are not afraid to follow truth wherever it may lead, nor tolerate error so long as reason is free to combat it."

Academic Freedom and Tenure. Tenure is an indispensable precondition for academic freedom. It is, in fact, a guarantee that the institution subscribes to the principle of academic freedom, and that its members may not be dismissed without adequate cause. Termination of tenure should occur only in cases of bona fide financial exigency in the University or when it has been demonstrated that the teacher lacks professional or moral fitness or competence as a teacher.

In the interpretation and the application of these principles we shall expect the University authorities to be quick to protect its heritage of academic freedom, in doubtful cases remembering that an excess of freedom is always less dangerous than an excess of constraint.

The statement on academic freedom reprinted on our covers was adopted by the University of Vermont Faculty Senate September 23, 1954.

versial matter which has no relation to his subject. Limitations of academic freedom because of religious or other aims of the institution should be clearly stated in writing at the time of the appointment.

"The teacher is a citizen, a member of a learned profession and an officer of this institution. When he speaks or writes as a citizen he should be free from institutional censorship or discipline, but his special position in the community imposes special obligations. As a man of learning and an educational officer he should remember that the public may judge his profession and his institution by his utterances. Hence he should at all times be accurate, should exercise appropriate restraint, should show respect for the opinions of others, and should make every effort to indicate that he is not an institutional spokesman."

In additon there are recognized qualifications which must be attained and maintained before the privilege of being a member of the academic profession can be considered a permanent one: satisfactory performance as a teacher, scholarship, and high moral standards.

Responsibility of the Institution to the Faculty. The University must defend tenaciously the right of its members to think and express their thoughts freely and to make those choices within the law guaranteed to every citizen. This includes the right of dissent since any democratic institution ceases to merit the name democratic when this fundamen-