



FACULTY SENATE

Approved Minutes
November 09, 2015

Called to order 4:04 p.m.

Senators in Attendance: 53

Absent: Senators Hondal (Biochemistry), Jones (BSAD), Heiss (CDEA), Smith (Education), Pinder (Engineering), Yoo (English), Perry (Extension), Weinstein (Family Medicine), Ross (FPPC), Busier (Leadership & Developmental Science), Teuscher (Medicine), Solomon (Neuroscience), Pope (Nutrition & Food Science), Nelms (Orthopaedic Rehabilitation), Contompasis (Pediatrics), Wittpenn (Pediatrics), Nelson (Political Science), Aultman-Hall (President), Eyler (Psychiatry), Wu (Rehab & Movement Science), Prue (SAC), Witkin (Social Work), Khanna (Sociology), Adams (Surgery), Modereger (Theatre)

1. Approval of the Minutes. The minutes of October 12, 2015 were approved as written.

2. Senate Vice President's Remarks- Jan Carney

Jan Carney publically acknowledged Betsy Greene, Associate Professor of Animal Science and Extension Equine Specialist in the Animal Science Department, for her many years of service to the Faculty Senate. Betsy has accepted a position at the University of Arizona. In addition to some brief highlights of Betsy's important and fascinating work, Dr. Carney publically recognized Betsy Greene for her years and depth of service. We count on the service, energy and expertise of faculty members to help us in our many duties at the Faculty Senate.

As a follow-up to the *Faculty Senate 101* presentation at the September meeting (available in the September 2015 Faculty Senate minutes), Jan Carney presented *Faculty Senate 102: What does "One UVM" Mean?* (attached to these minutes).

The Faculty Senate 102 presentation focused on "One UVM" as an important team concept. Highly functioning teams have knowledge and understanding of the roles and responsibilities of each team member. Vice President Carney invited everyone to review the websites of the Board of Trustees, the Faculty Senate, the President and the Provost in order to see the context of what we do. The Administration and the Faculty Senate share responsibility for the effective management of the academic affairs of the University. The Board of Trustees has empowered the Faculty Senate to review and establish policy in some areas, and in other areas to review, advise, and to work together to make recommendations for the possible formulation of policy. Themes of the Faculty Senate for this year are to 1) increase faculty engagement across the campus,

2) improve communication on campus, by better utilizing the Faculty Senate and our Senators, and 3) Acting as “one UVM” – all working together on the same goals for the betterment of UVM

Everyone was encouraged to educate themselves about their role in “One UVM” by reading the Faculty Senate Constitution and Bylaws, which is also available on the Faculty Senate website. In addition, it is important to be knowledgeable about the work at the University, both internal and external. The websites of the Board of Trustees, the President and the Provost are terrific resources. The Faculty Senate bylaws direct the Faculty Senators to communicate with every campus constituency, and student body, and to be liaisons back to our Colleges and Departments.

3. UVM President & Provost Remarks.

Provost Rosowski spoke on two topics 1) an update on the new budget model, and 2) NEASC and University wide assessment. His presentation is attached to these minutes.

Provost Rosowski provided a review of the history of the IBB process at UVM, which was a 12-month development process and 12-month implementation process that led to the launch on July 1, 2015. More than 280 meetings have taken place with academic units, governance groups, leadership teams, individuals and groups across the campus over a 28-month period. The IBB website is a great resource. IBB meetings are still available “anyone, anytime, anywhere” by request to the Provost’s Office.

Provost Rosowski described the preparations required for the upcoming NEASC review. NEASC is our regional accreditor. UVM’s next full review is scheduled for 2019. The self-study begins in 2018. Our goal is to get full accreditation in this cycle so we do not have to go through intermediate reviews. There are three things needed for NEASC: 1) each academic program must have a one-page description, 2) each general education requirement must conduct an assessment. 3) there must be an institution wide system for assessment that utilizes results directly to inform action at the level of the program or the department. The three steps for program assessment are the same for both programs and general education requirements: 1) state program/general education learning objectives, 2) gather some information, through direct and indirect measures, on how well students are achieving the goals that are set, 3) take the information you learned and feed it back through one annual meeting to inform the evolution of the program, or for general education through some action. Provost Rosowski shared a description of the institution-wide system that he envisions for using the assessment results to inform action.

4. Professional Standards – Robert Rodgers, Chair of the PSC brought one item of business to the Faculty Senate for their consideration.

The Faculty Senate voted to approve the proposed new faculty pathway rank of Faculty Scientist in the College of Medicine. Vote: Approved 98% Oppose 2%

5. Curricular Affairs. Chair of the Curricular Affairs Committee, Cathy Paris, brought two items of business to the Faculty Senate for their consideration.

The Faculty Senate voted to approve the proposal to add the six-credit Diversity requirement to the General Education portfolio. Vote 83% Approve 83%, Oppose 7%, Abstain 10%

The Faculty Senate voted to approve the proposal for a new Bachelor's of Science degree program in Biomedical Engineering. Vote: Approve 86%, Oppose 5%, Abstain 9%

6. New Business. There was no new business at this time.

7. Adjourn.

Motion: Moved by Betsy Greene to adjourn

Motion carried.

The meeting was adjourned at 5:04 pm.

Faculty Senate 102: What does “One UVM” Mean?

Jan K. Carney, MD, MPH

Professor of Medicine, Associate Dean for Public Health

UVM Faculty Senate, Vice-President

UVM Board of Trustees

- ▶ The Board of Trustees has full legal responsibility and authority for the University of Vermont, including entire management and control of property and affairs of the university.
- ▶ The Board of Trustees sets and approves policies, budgets and strategic planning.
- ▶ The Board of Trustees at the University of Vermont consists of 25 members (9 legislative, 9 self-perpetuating, 3 gubernatorial, and 2 students; the Governor and the President of the University of Vermont serve as ex-officio members during their terms of office).
- ▶ Each member serves a 6-year term, with the exception of the student members who serve 2 year terms. All terms begin on March 1.
- ▶ <http://www.uvm.edu/trustees/>

UVM: Office of The President (excerpts)

- ▶ “The President reports to the Board of Trustees and serves as an ex officio voting member of its Board of Directors and Executive Committee.....
- ▶ The President sets expectations for both scholarly endeavor and teaching success that guide both hiring and promotion. The Provost, the Deans, the Chairs, and fellow faculty will hire and promote but the President must lead the construction and ongoing development of a great faculty.
- ▶ The President leads a fiscally innovative and strategic administration, maximizing both revenue and productivity, striving to develop a sustainable financial model for UVM, and putting every available resource to work for the good of the academic program.”
- ▶ http://www.uvm.edu/president/?Page=about/tom_sullivan.html

Mission & Function of the Faculty Senate

Constitution and Bylaws - Preamble

- ▶ The administration and the Faculty Senate of the University of Vermont share responsibility for the effective management of the academic affairs of the University.
- ▶ **Authority in matters related to the academic mission of the University is vested in the faculty by the Board of Trustees.**
- ▶ This authority is exercised in the Faculty Senate by elected senators with voting privileges and by committees authorized to act on their behalf.

Mission & Function of the Faculty Senate

Constitution and Bylaws

- ▶ Authority: Under the authority of the Board of Trustees, the UVM Faculty Senate is empowered to:
 - ▶ 1.1 To review and establish policy
 - ▶ 1.2 To review, to recommend, and to participate in the formulation of policy
- ▶ <http://www.uvm.edu/~facsen/RFaculty%20Senate%20Constitution%20and%20Bylaws%2004-09-15.pdf>

1.1 To review and establish policy with respect to the following matters:

- a. Academic freedom
- b. All curricular matters
- c. **Research and scholarship**
- d. Admissions standards and prerequisites
- e. Requirements for regular certificates and degrees
- f. Regulations regarding attendance, examinations, grading, scholastic standing, and honors
- g. Teaching quality
- h. **Professional standards** and criteria for positions accorded academic rank.
- i. Other academic matters referred to it...

Faculty Senate Themes 2015-2016

1. **Increasing faculty engagement** across our campus
2. **Improving communication on campus**, by better utilizing the Faculty Senate and our Senators
3. **Acting as “One UVM”** - all working together on the same goals, no matter if we are administration, faculty, no matter what school or college.

Big Picture - One UVM What Does this Mean?





Faculty Senate Roles and Responsibilities

- ▶ **Educate Ourselves** about Our Role in “One UVM”
 - ▶ Our Constitution and Bylaws <http://www.uvm.edu/~facsen/>
 - ▶ BOT <http://www.uvm.edu/~trustees/>
 - ▶ President <http://www.uvm.edu/president/> Strategic Action Plan
 - ▶ Provost <http://www.uvm.edu/provost/> Academic Excellence Goals for UVM
- ▶ **Engage other faculty** in our own colleges and departments
- ▶ **Communicate** (this is in our constitution and bylaws)
- ▶ **Remember our Roles and Responsibilities**
- ▶ **Remember our Goal - One UVM!**



1. Incentive-based Budgeting (IBB)
2. NEASC and University-wide assessment



Invited Briefing to the Faculty Senate

David V. Rosowsky, Provost and Senior Vice President

November 9, 2015



SOME KEY POINTS (by way of background)

- ✓ UVM Budget Self-Study completed in Dec. 2012 (FPPC Committee, plus)
- ✓ IBB process initiated Sept. 2013
 - Steering Committee includes 3 Senators (including FPPC chair)
 - Subcommittees included 8 Senators (including Senate President and VP)
- ✓ First phase (12 months): IBB Development (2013-14)
- ✓ Second phase (12 months): IBB Implementation (2014-15)
- ✓ Transition completed with launch of new budget model July 2015
- ✓ Presentations to Full Senate Sept. 2013, Nov. 2013, March 2014
- ✓ Presentations to Senate Executive Committee Sept. 2013, April 2014
- ✓ Presentations to FPPC Oct. 2013, March 2014, April 2014
- ✓ Plus more than 280 meetings with academic units, governance groups, and leadership teams over the last 28 months



BY THE NUMBERS...



- 1 Big Idea (totally transform the budget process/model at the University)
- 1 New website dedicated to the transition
- 1 Steering Committee
- 2 Years to complete the transition
- 7 Guiding Principles
- 8 Subcommittees
- 8 Campus-wide open forums
- 11 Faculty on Steering Committee (of 22)
- 13 Faculty on the 2013 Budget Advisory Committee (BAC)
- 14 Campus-wide updates distributed and posted online
- 18 Recommendations from BAC found in IBB
- 43 Faculty members on IBB subcommittees
- 200+ People engaged as members of committees/subcommittees
- 280+ Meetings, presentations, briefings, campus engagements in 2 years



By the **Website**



[Final Report](#)

[Communications to Campus](#)

[About Subvention](#)

[Presentations](#)

[Steering Committee](#)

[Reports](#)

[Subcommittees](#)

[Guiding Principles](#)

[Project Timeline](#)

[Informational Resources](#)

[Implementation](#)

[Related Topics](#)

[Suggestions/Questions/Concerns](#)

[FAB IBB Reports and Data](#)

[Across the Green](#)



The University of Vermont

Incentive-based Budgeting (IBB)

- Office of the Provost
- Incentive-based Budgeting
 - Steering Committee
 - Subcommittees
 - Project Timeline
 - Communications to Campus
 - Presentations
 - Reports
 - Guiding Principles
 - Informational Resources
 - Implementation
 - Related Topics

Incentive-based Budgeting

Information for Students

- Information for Students about IBB at UVM - November 4, 2015

Final Report

- IBB Final Report - January 29, 2015
- IBB Preliminary Final Report Feedback - October 8, 2014
- President Sullivan's Response to the IBB Preliminary Final Report: July 9, 2014
- IBB Preliminary Final Report - June 30, 2014

About Subvention

- About Subvention: October 2015

The Origin of IBB at UVM

In academic year 2012-13, the University community engaged in a discussion about the characteristics and operation of its existing budget model. Those discussions included governance leaders, Trustees, academic and administrative business managers, members of the Faculty Senate, and other constituents. There was uniform agreement on the model's problems: lack of transparency, undue complexity, little flexibility, and few incentives.

President Sullivan asked Provost David Rosowsky, in his role as UVM's Chief Budget Officer, to lead the effort to develop a new incentive-based budget (IBB) model for the University. The Provost chaired the IBB Steering Committee that was responsible for the final recommendations that were made to the President on the design and methodology of an overall incentive-based budget model for the University of Vermont. The IBB model was developed in FY14. Its performance was monitored in FY15 – the parallel year – during which the old model remained in place. The UVM IBB model went live in FY16.

The development, implementation and continuing assessment of the Incentive-based Budget Model will be guided by the [Academic Excellence Goals](#) for the University of Vermont and the following principles:

- Creates incentives that promote academic quality and excellence
- Creates incentives at all levels of the University that promote financial sustainability
- Encourages innovation and entrepreneurship throughout the University
- Provides transparency, clarity, and predictability
- Can be easily understood, is easy to implement and operate, and is flexible
- Can operate in all cycles of the economy, whether robust or downturn
- Fosters interdisciplinary scholarly and teaching activity

IBB Suggestions, Questions, Concerns... submit here

IBB Meetings: Anyone, Anytime, Anywhere

We will meet with anyone, anytime, anywhere to discuss IBB. Contact [Alberto Citarella](#) to schedule a meeting.

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“It has been my privilege to work with the 240 members of our campus community involved in the development and implementation of IBB, and to witness such a collaborative, inclusive, and authentic process. This bodes very well for the future of the University of Vermont.”

-D. Rosowsky, Provost

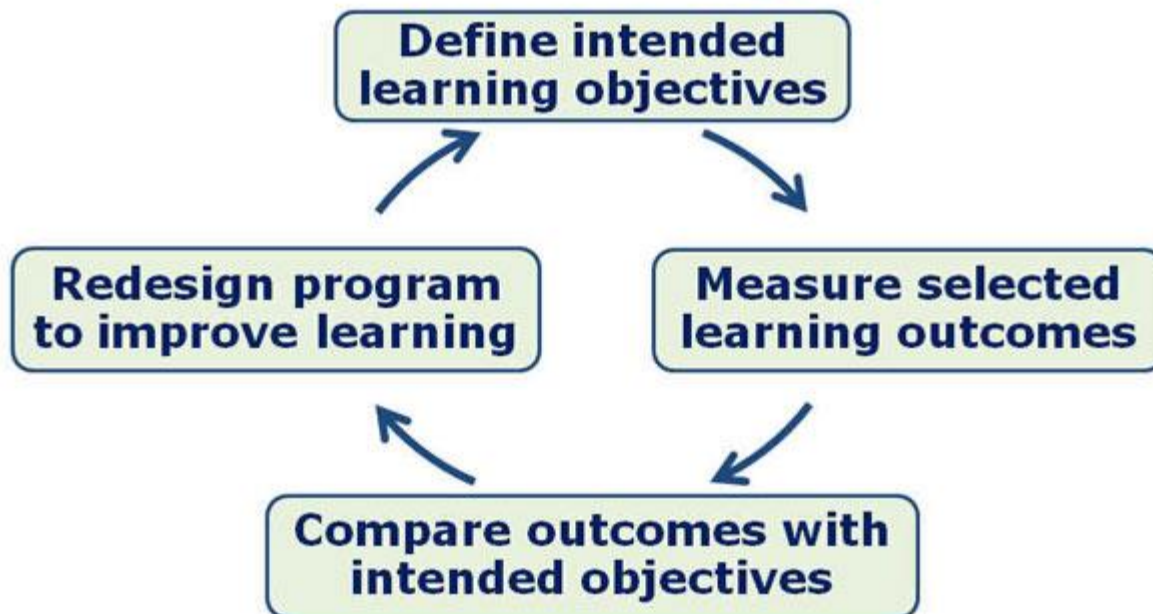


Second Briefing Topic:

NEASC and University-wide Assessment



Assessment Learning Cycle





Q&A and Discussion



Memo To: The Faculty Senate

From: The Professional Standards Committee of the Faculty Senate
Robert Rodgers, Chair

Date: 20 October 2015

Subject: Approval of a new faculty pathway rank in the College of Medicine

The Professional Standards Committee at its meeting on 19 October 2015 unanimously approved the action recommended herewith:

At its meeting on 19 October 2015, the Professional Standards Committee approved a new faculty pathway rank in the College of Medicine, that of Faculty Scientist. This position will replace that of Research Associate, a title no longer widely used in U.S. medical schools. Faculty Scientist is an entry-level faculty position in the College of Medicine. Faculty Scientists are appointed for a five-year term. Continuance of the appointment (even within the 5-year period) is contingent upon the availability of restricted funds, a continuing need for an individual with a particular set of skills, and documented research competence.

The proposal enjoys the strong support of the College of Medicine faculty and the unanimous support of the College leadership.

The proposal was originally submitted to the Associate Provost for Curricular Affairs in March 2015; it was considered and unanimously recommended by the Curricular Affairs Committee of the Faculty Senate (9 April 2015); Faculty Senate meeting of 14 May 2015 referred the matter to Professional Standards Committee.

Curricular Affairs Committee of the Faculty Senate

Memo

To: The UVM Faculty Senate
From: Curricular Affairs Committee of the Faculty Senate, Cathy Paris, Chair
Date: October 16, 2015
Re: Approval of a proposal to bring the existing six-credit Diversity requirement into the General Education curriculum

The Curricular Affairs Committee at its meeting of October 8, 2015 unanimously approved the action recommended in the following memo.

The University of Vermont's six-credit Diversity requirement was approved by the Faculty Senate in April 2006 and implemented in Fall 2007. At the time it was approved, the Diversity requirement was the only university-wide curricular requirement at UVM. It was not until five years later, in the spring of 2011, that the Faculty Senate approved the development of a General Education curriculum. Thus the Diversity requirement has existed, until now, outside the framework of General Education.

Six curricular focus areas ("outcomes") were identified in the 2011 General Education proposal. Two of these, Sustainability and Writing & Information Literacy, have already been implemented as University-wide General Education requirements. Diversity was a third focus area identified in the 2011 proposal, however the existing six-credit requirement, acknowledged to be in need of revision, was not immediately brought into the Gen. Ed. portfolio.

Over the past two years, the Diversity Curriculum Review Committee (DCRC), in partnership with the General Education Diversity Committee, worked to revise the diversity criteria and competencies, with the goals of clarifying the criteria for D1 and D2 courses, bringing the diversity competencies into better alignment with those criteria, and stating more explicitly the intended outcomes of the diversity curriculum. The Faculty Senate approved these revisions in the spring of 2015.

The UVM Diversity requirement has been in place for eight years; it is established as part of the culture of our institution. An extensive portfolio of approved diversity courses is in place, in subject areas ranging from Anthropology to World Literature. The DCRC, operational for seven years, has developed an effective set of [policies and procedures](#). An assessment strategy for the Diversity requirement is under development and a faculty development program is in the planning stages. Thus the pieces are all in place to bring the Diversity requirement into the UVM General Education portfolio.

Be it then RESOLVED that the UVM Faculty Senate approve the addition of the six-credit Diversity requirement to the General Education portfolio. This move will not in any way change the existing Diversity requirement, but will clearly identify it as part of the body of knowledge that we regard as central

to the education of a UVM undergraduate student and align the General Education program with the values expressed in [*Our Common Ground*](#).

Curricular Affairs Committee of the Faculty Senate

Memo

To: The UVM Faculty Senate
From: Curricular Affairs Committee of the Faculty Senate, Cathy Paris, Chair
Date: October 20, 2015
Re: Approval of a proposal for a new B.S. degree program in Biomedical Engineering from the College of Engineering and Mathematical Sciences

The Curricular Affairs Committee at its meeting of October 8, 2015 unanimously approved the action recommended in the following memo.

We have reviewed a proposal for a new Bachelor's of Science in Biomedical Engineering degree program (BSBME) submitted by the College of Engineering and Mathematical Sciences (CEMS) School of Engineering (SoE) and recommend approval. The degree program, developed in collaboration with the College of Medicine (COM), will be housed in the School of Engineering. The program will be coordinated jointly by Jeff Frolik, Associate Professor, School of Engineering, and Jason Bates, Professor of Medicine, Department of Medicine. It is anticipated that the new degree program will be offered beginning Fall 2016.

Program Description and Rationale

Biomedical engineering is a well-established discipline that contributes significantly to the health care needs of society. The proposed BSBME is a four-year degree program that seeks to train the next generation of problem solvers in the application of engineering methods in biomedicine. The program provides a solid foundation in engineering as well as life and physical sciences, human cell biology, anatomy, and physiology. Students in the BSBME program will also gain hands-on experience in real-world biomedical problems. Within the degree, students specialize in one of three areas (Specializations), listed below. The Specializations were designed to leverage existing faculty expertise within SoE and COM.

- **Biosensing & Instrumentation:** focuses on established medical instrumentation and imaging techniques, and newer areas including biosensors and neural action of prosthetics
- **Cell, Tissue, & Organ Biomechanics:** focuses on the growing areas of tissue engineering and biomechanics of bone and vascular tissue
- **Systems & Network Biology:** focuses on understanding biological systems and diseases as complex networks, including neural networks and disease transmission. The Systems & Network Biology Specialization capitalizes on the expertise and courses associated with the Complex Systems Initiative as well as expertise in SoE and COM.

Justification and Evidence for Demand

Biomedical engineering (BME) is the fifth largest engineering discipline in the U.S. at the undergraduate level, and the number of BME degrees awarded has grown roughly 30% over the past four years. Nation-wide, there are currently 91 ABET (Accreditation Board for Engineering and Technology) accredited BME degree programs. Of these, more than 40 are offered by institutions that lack an associated medical school. Regionally, there are nine other programs, three of which are offered by universities without medical schools. Thus, UVM is in a good position to attract students interested in biomedical engineering. Clarkson University, which currently offers a minor in BME and lacks a medical school, has expressed interest in partnering with UVM (3+1 program), however this is not essential to the success of the proposed program. Importantly, the proposed BME degree supports the University's efforts to expand education, and will make use of the new STEM complex.

The proposed B.S. in BME differs from the current B.S. in Electrical Engineering and B.S. in Mechanical Engineering by at least 30 credit hours. Students in all engineering programs share a set of foundation courses, however the BME program foundation also includes additional courses in organic chemistry, and human cell biology and anatomy and physiology. Further differentiation occurs in the technical electives taken by BME students. The only overlap outside SoE would be upper-level courses in other programs (e.g. Biochemistry, Biostatistics, Microbiology & Molecular Genetics) that could be taken by BME students as technical electives.

In addition to the demand evidenced by the growing number of BME degrees awarded in the U.S., the number of students taking the PSATs who have selected biomedical engineering as a possible major has more than doubled over the past ten years. In a survey of current first-year students carried out by SoE, 20% indicated they would be very interested in a BME degree, and another 20% indicated possible interest. Enrollments in SoE have grown 16% over the past three years, and future growth is predicted. It is also anticipated that a BME degree could attract students interested in medicine that would not necessarily consider engineering. A Ph.D. in Bioengineering is currently offered through SoE, and a proposal for a M.S. degree is in progress. The presence of these programs could be attractive for undergraduates considering biomedical engineering degrees and could also serve as a source of candidates for the post-baccalaureate programs.

Students graduating from UVM with a B.S. in BME will be well positioned to obtain gainful employment. Locally, companies such as GE Healthcare, Med Associates, and others employ people with BME expertise. Based on an <http://www.engineerjobs.com/> search, there is a demonstrated need for engineers with BME training in New England, particularly the Boston area. According to Forbes, there has been 10% job growth in Biomedical Engineering from 2010 to 2014, and 2010 to 2020 growth is expected to be 62%.

Admission Requirements and Process

The requirements and process for admitting students into the BSBME program will be similar to those for the existing undergraduate engineering degrees. Students will be selected for the BME degree based on interest and academic standing, similar to students in the other engineering programs at UVM.

Curriculum

Coursework in the BME program is divided into two phases, Foundation and Specialization. Both phases leverage existing courses taught by faculty in SoE, COM, the College of Arts and Sciences (CAS), the College of Nursing and Health Sciences (CNHS), and the College of Agriculture and Life Sciences (CALS). The curriculum developed for each of the Specializations meets the criteria for ABET accreditation. The total number of credit hours to obtain a BSBME is 128 to 132, in line with the other accredited engineering degrees, which range from 125 to 128 credit hours. The curriculum is described below; a summary table of the required courses is provided at the end of this report.

The Foundation Courses consist of a core of pre-engineering technical requirements taken by all engineering students plus additional courses in organic chemistry, human cell biology, anatomy and physiology, mathematics, and basic electrical and mechanical engineering. Additionally, all BME students take a set of Bioengineering core courses including an introduction to biomedical engineering, bioelectromagnetism, workshops in BME, and laboratory experiences (e.g. rotation through clinical/research labs in COM). These BME core courses are the only new courses that must be developed before the program is initiated.

Within each specialization, students take a set of Specialization Required Courses, and select courses from a list of approved Specialization Electives. Students in all specializations also select appropriate BME Technical Electives, which are 200-level or above courses. Students also complete a senior capstone design project, as do student in the existing engineering programs.

Advising

Advising will be identical to that for existing engineering programs at UVM. First-year BME students will be advised by CEMS student services. In subsequent years, students will be advised by a faculty member in SoE; they may also have a secondary advisor from COM.

Anticipated Enrollment and Impact on Current Programs

The proposers project that the new BME degree will enroll 30 to 40 students in the first year. The numbers are informed by survey results gauging interest in a BME degree among current first-year students in the School of Engineering and by comparison to enrollments at schools with recently accredited BME degrees. The expectation is that the program will attract new students, and not simply redistribute students from the other four established engineering degrees. This expectation is based on information obtained from three institutions that have recently inaugurated BSBME degrees, where steady or increased enrollment was observed in their established engineering programs.

The proposal authors recognize that there will be a significant impact on the foundation courses in SoE as well as CAS and, to a lesser degree, CNHS. Most of the foundation courses (e.g. CHEM 031) consistently reach capacities, and thus additional resources will be required to support the addition of 30-40 new BME students. Mechanisms and funding for dealing with the anticipated enrollment increases are described in the section below.

Staffing Plan, Budget, and Resource Requirements

Inauguration of the BSBME program will require resources to support increased enrollment in the established foundation courses. Additionally, new laboratory space, teaching space, and equipment

are needed to support the BME laboratory experiences and courses. The proposal includes the immediate hire of a new Lecturer in SoE to deal with the anticipated additional teaching load created by incoming BME students during the Foundational Phase of the BME degree. The new hire will also have expertise to teach BME specific labs, courses, and workshops. Specific plans to renovate four rooms in Votey to accommodate the laboratory and classroom needs are also described in the proposal. SoE recently hired a full-time laboratory manager who will help support the lab courses associated with the BME program. Future plans include hiring a new tenure-track faculty whose work is in line with at least one of the three BME Specializations, and who could also instruct courses of interest to engineering students from other programs.

First year costs, including student recruitment, lecturer search and salary, renovations, equipment, and general operating costs are expected to be \$758,600. Five-year costs, which include a new tenure-track hire, are predicted to be about \$1,768,600. Under the new IBB budget model, the proposers state that the program should be self-funding. They estimate, however, a one-time startup cost of \$900,000. The Provost's office has committed \$900,000, available beginning in FY16, to be spent over time as needed. This sum will be matched by \$868,000 from CEMS.

As noted above, the inauguration of a BSBME program will significantly impact units outside of CEMS, specifically COM, CAS, and CHNS. The College of Medicine has capacity to support the BME technical elective courses taken in a student's junior and senior years and ANPS 19/20 that BME students will take in their sophomore year. CAS will be most impacted, as it houses several of the foundation courses (CHEM 031, CHEM 042, and PHYS 031). The Associate Dean of CAS has promised an estimated investment of about \$100,000 during the first two years for staffing additional lab and lecture sections.

Assessment Plan

The program will be evaluated by the Faculty Senate's Academic Program Review process on the standard eight-year cycle. Application for ABET accreditation is anticipated in 2020.

Evidence of Support

SoE faculty voted to approve the proposed new B.S. in Biomedical Engineering (18 yes, 3 no, 2 abstain). COM Senators and CEMS faculty unanimously approved the proposal. Letters of support for the new BSBME have been obtained from the Deans of CEMS, COM, and CHNS, the Associate Dean of CAS, and the CEMS Board of Advisors.

Strengths of the Program

Biomedical engineering is a growing field that contributes significantly to the health care needs of society. UVM is in a good position to be attractive to students interested in biomedical engineering because of the associated medical school, and there is strong evidence of source candidates for in a new B.S. in BME. The proposed program capitalizes on existing courses and expertise, strengthens existing ties between CEMS and COM, and supports the University's endeavors to increase STEM education. Once established, the program is predicted to be self-sustaining under the IBB budget model; funds required to initiate the new degree program have been pledged. The proposed program has strong approval from CEMS as well as COM, CAS, and CHNS. It is evident that the proposers have put significant thought into crafting a curriculum that will provide students with a solid foundation in quantitative methods of engineering and opportunities to gain additional skills

and hands-on experience in their area of specialization. Students graduating with a BSBME will be in an excellent position to gain employment, as there is a demonstrated demand for engineers with biomedical expertise.

CURRICULUM SUMMARY TABLE (TOTAL CREDITS = 129 – 132)

Pre-Engineering Technical Requirements		
CHEM 031	4	19
PHYS 031	4	
MATH 021/022	8	
CS 020	3	
General Education Requirements		
ENGS 001	3	18
Gen. Ed. Electives	9	
Diversity (D1 and D1 or D2)	6	
Science & Engineering Foundation Courses		
CHEM 042	4	35
MLRS 034	4	
ANPS 019/020	8	
MATH 121/122	7	
MATH 271	3	
ENGR 002	2	
EE 100	4	
ME 114	3	

Bioengineering Core Courses – ALL NEW		
BME 001	2	23
EE 1XX	3	
Lab Experience I/II	4	
Fall/Spring Workshops	2	
BME Technical Electives ¹	12	
Capstone Design Project		
BME 187/188	6	6

Specialization Courses

Biosensing & Instrumentation			Cell, Tissue, & Organ Biomechanics			Systems & Network Biology		
EE 004	3	19 core 12 electives	ME 012	3	18 core 12 electives	ME 111 <i>or</i> EE 171	3 4	16-17 core 12 electives
EE 082	2		ME 014	3		CS 084	3	
EE 120	4		ME 040	3		CS 110	4	
EE 134	4		ME 101	3		CS 124	3	
EE 171	3		ME 143	3		STAT 143	3	
STAT 151	3		STAT 143	3		SNB Electives ⁴	12	
BI Electives ²	12		CTO Electives ³	12				

¹ List of possible 200-level courses. Options vary between Specializations, though there is a significant amount of overlap.

² Any 1XX or higher EE course. ME, CE, ENGR, CS, MATH/STAT, or life/physical sciences courses with approval of BME advisor. Must be justified as being related to the student's long-term interests. At least 3 hours must be from 1XX or higher engineering courses.

³ Any 1XX or higher ME course. EE, CE, ENGR, CS, MATH/STAT, or life/physical sciences courses with approval of BME advisor. Must be justified as being related to the student's long-term interests. At least 6 hours must be from 1XX or higher engineering courses.

⁴ Engineering, CS, MATH/STAT, or life/physical sciences courses with approval of BME advisor. Must be justified as being related to the student's long-term interests. At least 6 hours must be from 1XX or higher engineering courses.