

**Microbiology and Molecular Genetics  
Advising Form 2023-2024**

**Student's Name:**

**Major:**

**UVM Overall Requirements**

120 course credits and a cumulative GPA above 2.0 are required to graduate.

**UVM Required Courses**

**Foundational Writing and Information Literacy:** One of the following required (first-year students).

<b>Course</b>	<b>Semester and Year Completed</b>
ENGS 1001	
or ENGS 1002	
or HCOL 1000	

**Diversity Requirement:** Two 3-credit University-Approved Diversity (D) courses addressing race relations and ethnic diversity (before graduation).

<b>Course</b>	<b>Semester and Year Completed</b>
Category D1	
Category D1 or D2	

**Sustainability Requirement:** One 3-credit University-Approved Sustainability (SU) Course

<b>Course</b>	<b>Semester and Year Completed</b>

**College of Agriculture and Life Sciences (CALs) Core Requirements**

***Knowledge-based***

**Physical and Life Sciences**

Satisfied by MMG Major Core Requirements

**Social Sciences (6 credits)**

Anthropology, Community Development and Applied Economics, Economics, Geography, History, Political Science, Psychology, Sociology, Women and Gender Studies, Select HCOL courses

Course	Semester and Year Completed

**Humanities and Fine Arts (6 credits)**

Art, Classics, Theater, Music, Philosophy, Religion, Foreign Language, American Sign Language, English/Literature, Poetry, Film, Select HCOL courses

Course	Semester and Year Completed

***Skills-based:***

**Oral Communication (3 credits)**

CALS 1010 or CALS 2830 or SPCH 1400: Communication Methods and one or more courses in which the student presents a total of three graded oral presentations

Course	Semester and Year Completed

**Written Communication (3 credits)**

Foundational Writing and Information Literacy Requirement (see above) and one or more courses in which the student writes a total of three graded “process” paper (papers requiring redrafting)

Course	Semester and Year Completed

**Information Technology**

Applications of Information Technology are satisfied by Program Core Requirements

Course	Semester and Year Completed
Information Technology: CALS 1020 <u>or</u> CALS 1850 <u>or</u> CS 1210	

**Quantitative**

Mathematics and Quantitative Skills Application (both satisfied by Program Core Requirements) and Statistics: STAT 1410 or STAT 3000

Course	Semester and Year Completed
Statistics: STAT 1410 <u>or</u> STAT 3000	

**Microbiology (MICR) and Molecular Genetics (MGEN) Core Requirements:****Major Requirements – 60 total credits**

<b>Course</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 1010:</b> First-Year Colloquium	1	
<b>MMG 1020 (SU):</b> Unseen Worlds – Microbes and You	3	
<b>BCOR 1400 &amp; 1450</b> <u>or</u> <b>BCOR 1425:</b> Exploring Biology	4-8	
<b>MATH 1212 &amp; 1224</b> <u>or</u> <b>1234 &amp; 1248:</b> Calculus	6 <u>or</u> 8	
<b>CHEM 1400 &amp; 1450:</b> General Chemistry	8	
<b>CHEM 2580 &amp; 2585:</b> Organic Chemistry	8	
<b>MMG 2010:</b> Microbiology & Infectious Disease	4	
<b>MMG 2040:</b> Intro to Recombinant DNA Tech	4	
<b>MMG 2060:</b> Intro to Biomedical Research Methods	3	
<b>BCOR 2300:</b> Genetics	3	
<b>BCOR 2500</b> <u>or</u> <b>MMG 2990:</b> Molecular Cell Biology	4 <u>or</u> 3	
<b>BIOC 3001</b> <u>or</u> <b>BIOC 3075:</b> Biochemistry	3	
<b>STAT 1410</b> <u>or</u> <b>STAT 3000</b>	3	
<b>MMG 4899:</b> Senior Seminar	1	

Note: Although one year of physics (PHYS1 1400/1410 and 1450/1460) is *not* required for MICR and MGEN majors, most graduate, medical, dental, and other post-graduate programs do require this.

**Minimum Upper-Level Requirements for MICR Majors – 21 credits****2 of these 3 courses:**

<b>Course</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 3110:</b> Prokaryotic Molecular Genetics	3	
<b>MMG 3220:</b> Advanced Medical Microbiology	4	
<b>MMG 3300:</b> Adv. Studies in Emerging Infectious Diseases (D2, SU)	3	

**9 credits from these MMG courses:**

\* 300-level courses can only be taken with permission of course instructor and MMG advisor.

<b>Course</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 3010:</b> Molecular Cloning Lab	3	
<b>MMG 3070:</b> Biochemistry Laboratory	2	
<b>MMG 3200:</b> Environmental Microbiology	3	
<b>MMG 3230:</b> Immunology	3	
<b>MMG 3250:</b> Eukaryotic Virology	3	
<b>MMG 3990/3270:</b> Cancer Genetics	3	
<b>MMG 3310:</b> Bioinformatics and Data Analysis	3	
<b>MMG 3320:</b> Advanced Bioinformatics	3	
<b>MMG 3330:</b> Genetics & Genomics	3	
<b>MMG 3350:</b> Bioterrorism	3	
<b>MMG 3400:</b> Macromolecular Structures of Proteins & Nucleic Acids	3	
<b>MMG 6200*:</b> Cellular Microbiology	4	
<b>MMG 6520*:</b> Protein: Nucleic Acid Interactions	3	

**6 credits from courses on previous page or these additional approved electives:**

<b>Course</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 4990,2990:</b> Special Topics (Internships; Teaching Assistants)	variable	
<b>MMG 2995:</b> Undergraduate Research	variable	
<b>MMG 5990,3990:</b> Special Topics	variable	
<b>MMG 5990,3990:</b> Special Topics (Internships; Teaching Assistants)	variable	
<b>MMG 3995:</b> Advanced Undergraduate Research	variable	
<b>ASCI 3180:</b> Endocrinology	3	
<b>BIOL 3560:</b> Developmental Biology	3	
<b>BIOL 3505:</b> Neurobiology	3	
<b>BIOL 3535:</b> Genetics of Cell Cycle Regulation	3	
<b>BIOL 3565:</b> Developmental Molecular Genetics	3	
<b>BIOL 275:</b> Human Genetics	3	
<b>BIOL 286:</b> Forensic DNA Analysis	3	
<b>MLS 3300:</b> Clinical Microbiology II	4	
<b>BHSC 3420:</b> Immunology	3	
<b>BHSC 3440:</b> Immunology Lab	1	
<b>NFS 3203/3990:</b> Food Microbiology	4 <u>or</u> 3	
<b>PHRM 3010:</b> Introduction to Pharmacology	3	
<b>PHRM 5400:</b> Molecules and Medicine	3	
<b>PHRM 3720:</b> Toxicology	3	
<b>PHRM 3900:</b> Topics in Molecular & Cell Pharmacology	3	
<b>XXX 200+:</b> 200-level course in Life Sciences (permission of MMG advisor)	variable	

**Minimum Upper-Level Requirements for MGEN Majors – 21 credits****2 of these 3 courses:**

<b>Courses</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 3010:</b> Molecular Cloning Lab	3	
<b>MMG 3990/3270:</b> Cancer Genetics	3	
<b>MMG 3330:</b> Genetics & Genomics	3	

**9 credits from these MMG courses:**

\* 300-level courses can only be taken with permission of course instructor and MMG advisor.

<b>Courses</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 3070:</b> Biochemistry Laboratory	2	
<b>MMG 3200:</b> Environmental Microbiology	3	
<b>MMG 3220:</b> Advanced Medical Microbiology	4	
<b>MMG 3230:</b> Immunology	3	
<b>MMG 3250:</b> Eukaryotic Virology	3	
<b>MMG 3300:</b> Adv. Studies in Emerging Infectious Diseases (D2, SU)	3	
<b>MMG 3310:</b> Bioinformatics and Data Analysis	3	
<b>MMG 3320:</b> Advanced Bioinformatics	3	
<b>MMG 3330:</b> Genetics & Genomics	3	
<b>MMG 3350:</b> Bioterrorism	3	
<b>MMG 3400:</b> Macromolecular Structures of Proteins & Nucleic Acids	3	
<b>MMG 6200*:</b> Cellular Microbiology	4	
<b>MMG 6520*:</b> Protein: Nucleic Acid Interactions	3	

6 credits from courses on previous page or these additional approved electives:

Courses	Number of Credits	Semester and Year Completed
<b>MMG 4990,2990:</b> Special Topics (Internships; Teaching Assistants)	variable	
<b>MMG 2995:</b> Undergraduate Research	variable	
<b>MMG 5990,3990:</b> Special Topics	variable	
<b>MMG 5990,3990:</b> Special Topics (Internships; Teaching Assistants)	variable	
<b>MMG 3995:</b> Advanced Undergraduate Research	variable	
<b>ASCI 3180:</b> Endocrinology	3	
<b>BIOL 3560:</b> Developmental Biology	3	
<b>BIOL 246:</b> Ecological Parasitology	3	
<b>BIOL 3505:</b> Neurobiology	3	
<b>BIOL 3535:</b> Genetics of Cell Cycle Regulation	3	
<b>BIOL 3565:</b> Developmental Molecular Genetics	3	
<b>BIOL 275:</b> Human Genetics	3	
<b>BIOL 286:</b> Forensic DNA Analysis	3	
<b>MLS 3300:</b> Clinical Microbiology II	4	
<b>BHSC 3420:</b> Immunology	3	
<b>BHSC 3440:</b> Immunology Lab	1	
<b>NFS 3203/3990:</b> Food Microbiology	4 <u>or</u> 3	
<b>PHRM 3010:</b> Introduction to Pharmacology	3	
<b>PHRM 5400:</b> Molecules and Medicine	3	
<b>PHRM 3720:</b> Toxicology	3	
<b>PHRM 3900:</b> Topics in Molecular & Cell Pharmacology	3	
<b>XXX 200+:</b> 200-level course in Life Sciences (by permission of	variable	

Courses	Number of Credits	Semester and Year Completed
MMG advisor)		

### MMG COURSE OFFERINGS BY SEMESTER AND YEAR

\* 300-level courses can only be taken with permission of course instructor and MMG advisor.

MMG 1010	First-Year Colloquium	Every Fall
MMG 1020 (SU)	Unseen Worlds – Microbes and You	Every Fall
MMG 2010	Microbiology and Infectious Disease	Every Fall
MMG 2040	Introduction to Recombinant DNA Technology	Every Spring
MMG 2060	Introduction to Biomedical Research Methods	Every Spring
MMG 4990/2990	Special Topics (Internships; Teaching Assistants)	Every Fall/Spring
MMG 2995	Undergraduate Research	Every Fall/Spring
MMG 3010	Molecular Cloning Lab	Fall, Odd Years
MMG 3050	Biochemistry I	Every Fall
MMG 3060	Biochemistry II	Every Spring
MMG 3070	Biochemistry Laboratory & Discussion	Every Spring
MMG 3110	Prokaryotic Molecular Genetics	Every Fall
MMG 3200	Environmental Microbiology	Spring, Even Years
MMG 3220	Advanced Medical Microbiology	Spring, Even Years
MMG 3230	Immunology	Spring, Odd Years
MMG 3250	Eukaryotic Virology	Fall, Even Years
MMG 3990/3227	Cancer Genetics	Spring, Odd Years
MMG 3300 (D2, SU)	Advanced Studies in Emerging Infectious Diseases	Fall, Odd Years
MMG 3310	Bioinformatics and Data Analysis	Every Fall
MMG 3320	Advanced Bioinformatics	Spring, Even Years
MMG 3330	Genetics and Genomics	Every Fall
MMG 3350	Bioterrorism	Spring, Odd Years
MMG 3400	Macromolecular Structures of Proteins & Nucleic Acids	Spring, Even Years
MMG 5990/3990	Advanced Special Topics	Every Fall/Spring
MMG 5990/3990	Advanced Special Topics (Internships; TAs)	Every Fall/Spring
MMG 3995	Advanced Undergraduate Research	Every Fall/Spring
MMG 4899	Senior Seminar	Every Fall and Spring
MMG 6200*	Cellular Microbiology	Spring, Even Years

MMG 6520\*

Protein: Nucleic Acid Interactions

Spring, Even Years

**DOUBLE MAJORS AND MINORS****MICR/MGEN Double Major Requirements:**

**18** additional credits beyond the **21** credits required for a single MICR or MGEN major. Only **1** course may be double-counted.

**Required: 4 of these 6 courses:**

<b>Courses</b>	<b>Number of Credits</b>	<b>Semester and Year Completed</b>
<b>MMG 3010:</b> Molecular Cloning Lab	4	
<b>MMG 3110:</b> Prokaryotic Molecular Genetics	3	
<b>MMG 3220:</b> Advanced Medical Microbiology	4	
<b>MMG 3990/3227:</b> Cancer Genetics	3	
<b>MMG 3300:</b> Advanced Studies in Emerging Infectious Diseases (D2, SU)	3	
<b>MMG 3330:</b> Genetics & Genomics	3	

**First Major:**

- 9 credits 200-level MMG courses (see previous page)
- 6 credits MMG electives (see previous page)

**Second Major:**

- 9 credits 200-level MMG courses (see previous page)
- 3 credits MMG electives (see previous page)

**MICR/MGEN or MGEN/MICR Major/Minor Requirements:**

Majors/Minors must take 6 additional credits beyond the MICR or MGEN major. **No** courses may be double-counted.

**MICR or MGEN Minor Requirements: 18 or 19 total credits**

Courses	Number of Credits	Semester and Year Completed
<b>MMG 2010:</b> Microbiology & Infectious Disease	4	
<b>MMG 2040:</b> Introduction to Recombinant DNA Technology	4	
<b>BCOR 2300:</b> Genetics <u>or</u> <b>BCOR 2500/MMG 2990:</b> Molecular Cell Biology	4 <u>or</u> 3	
<u>9</u> additional credits of <b>MMG</b> courses at or above the 100-level	9	

NOTE: MLRS 242 (Immunology) cannot be used to satisfy a minor requirement.

**Bioinformatics Minor: 18 total credits**

Course	Number of Credits	Semester and Year Completed
<b>MMG 2060:</b> Introduction to Biomedical Research Methods	3	
<b>MMG 3310:</b> Bioinformatics & Data Analysis	3	
<b>MMG 3320:</b> Advanced Bioinformatics	3	
<b>MMG 3330:</b> Genetics and Genomics	3	
<u>+6</u> additional credits from the following courses:	6	
<b>MMG 2995:</b> Undergraduate Research	1-3	
<b>MMG 3110:</b> Prokaryotic Molecular Genetics	3	
<b>CS 2240:</b> Data Structures and Algorithms	3	
<b>CS 3540:</b> Machine Learning	3	
<b>STAT 1870:</b> Introduction to Data Science	3	
<b>STAT 3000:</b> Medical Biostatistics & Epidemiology	3	
<b>STAT 3010:</b> Statistical Computing & Data Analysis	3	

The following descriptions are intended only as examples.

### MICROBIOLOGY (MICR) MAJORS

#### FALL

##### FIRST YEAR

BCOR 1400	4 credits
<b>CHEM 31</b>	4 credits
MATH 1212 or 1234	3 (4) credits
MMG 1010	1 credit
MMG 1020 (SU)	3 credits

##### SECOND YEAR

CHEM 2580	4 credits
MMG 2010	4 credits
BCOR 2300	3 credits
ENGL 1002	3 credits

##### THIRD YEAR

BIOC 201	3 credits
MMG 2010 or 3250	3 credits
Elective (Soc. Sci.)	3 credits
STAT 1410/3000	3 credits
Elective (Fine Arts)	3 credits

##### FOURTH YEAR

MMG 3110	3 credits
<b>PHYS 11 or 51/21</b>	5 credits (Pre-Med; Pre-Grad) credits
MMG 3300	3 credits
Elective (Fine Arts)	3 credits
MMG 2990/3990	3 (var) credits

#### SPRING

BCOR 1450	4 credits
<b>CHEM 32</b>	4 credits
MATH 1224 or 1248	3 (4) credits
CALS 1020	3 credits
Elective (D1)	3 credits

CHEM 2585	4 credits
BCOR2500/MMG 1140	4-3 credits
MMG 2040	3 credits
MMG 2060	3 credits
CALS 2830	3 credits

MMG 3350	3 credits
MMG 3200	4 credits
MMG 2995	3 (var) credits
Elective (D2)	3 credits
Elective (Soc. Sci.)	3 credits

MMG 3220	4 credits
<b>PHYS 12 or 42/22</b>	5
MMG 2995/3995	3 (var) credits
MMG 3230	3 credits
MMG 4899	1 credit

If one is interested in pursuing a **clinically oriented microbiology career**, consider the following electives: **MMG 3300, MMG 3220, and MLS 3300** are absolutely essential. Also, **MMG 2995/3995, MMG 3230/ BHSC 3420, MMG 3250, and MMG 3010** are strongly suggested.

If one is interested in pursuing an **applied microbiology career**, consider the following electives: **MMG 3010 and NFS 3203** are absolutely essential. Also, **MMG 3200, MMG 3220, MLS 255, MMG 3230/ BHSC 3420, and MMG 3350** are strongly suggested.

If one is interested in pursuing a **general microbiology experience**, consider the following courses: **MMG 3010, MMG 3200, MMG 3220, MMG 3300, MLS 3300, MMG 3230/BHSC 3420, and MMG 3250** are absolutely essential. Any of the other courses listed would suffice.

The following descriptions are intended only as examples.

### MOLECULAR GENETICS MAJORS

#### FALL

##### FIRST YEAR

BCOR 1400	4 credits
CHEM 31	4 credits
MATH 1212 or 1234	3 (4) credits
MMG 1010	1 credit
MMG 1020 (SU)	3 credits

#### SPRING

BCOR 1450	4 credits
CHEM 32	4 credits
MATH 1224 or 1248	3 (4) credits
CALS 1020	3 credits
Elective (D1)	3 credits

##### SECOND YEAR

CHEM 2580	4 credits
MMG 2010	4 credits
BCOR 2300	3 credits
ENGL 1001	3 credits

CHEM 2585	4 credits
BCOR 2500/MMG 196	4-3 credits
MMG 2040	3 credits
MMG 2060	3 credits
CALS 2830	3 credits

##### THIRD YEAR

MMG 3050	3 credits
MMG 2012 or 3250	3 credits
Elective (Soc. Sci.)	3 credits
STAT 1410/3000	3 credits
Elective (Fine Arts)	3 credits

MMG 3060	3 credits
MMG 2995	3 (var) credits
MMG 3320	3 credits
Elective (D2)	3 credits
Elective (Soc. Sci.)	3 credits

##### FOURTH YEAR

PHYS 11 or 31/21	5 credits (Pre-Med; Pre-Grad)
MMG 2990/3990	3 (var) credits
MMG 3330	3 credits
MMG 3010 or 3250	3 credits

PHYS 12 or 42/22	5 credits
MMG 2995/3995	3 (var) credits
Elective (Fine Arts)	3 credits
MMG 4899	1 credit