

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

Student's Name:

Major:

Minor:

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).

Course	Semester and Year Completed
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).

Course	Semester and Year Completed
Category D1	
Category D1 or D2	

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

Course	Semester and Year Completed

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

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, HCOL 185 or HCOL 186

Course	Semester and Year Completed

Skills-based:

Oral Communication (3 credits)

CALS 001 or CALS183 or SPCH011: 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 002 <u>or</u> CALS 085 <u>or</u> CS 021	

Quantitative

Mathematics and Quantitative Skills Application (both satisfied by Program Core Requirements)

and Statistics: STAT 141 or STAT 200

Course	Semester and Year Completed
Statistics: STAT 141 <u>or</u> STAT 200	

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

Course	Number of Credits	Semester and Year Completed
MMG 001: First-Year Colloquium	1	
MMG 002 (SU): Unseen Worlds – Microbes and You	3	
BCOR 11 & 12 <u>or</u> BCOR 21: Exploring Biology	8 <u>or</u> 4	
MATH 19 & 20 <u>or</u> 21 & 22: Calculus	6 <u>or</u> 8	
CHEM 31 & 32: General Chemistry	8	
CHEM 141 & 142 <u>or</u> 143 & 144: Organic Chemistry	8	
MMG 101: Microbiology & Infectious Disease	4	
MMG 104: Intro to Recombinant DNA Tech	3	
MMG 106: Intro to Biomedical Research Methods	3	
BCOR 101: Genetics	3	
BCOR 103 <u>or</u> MMG196: Molecular Cell Biology	4 <u>or</u> 3	
MMG 205 <u>or</u> MMG 206 <u>or</u> BIOC 201 <u>or</u> BIOC 275: Biochemistry	3	
STAT 141 <u>or</u> STAT 200: Statistics	3	
MMG 299: Senior Seminar	1	

Note: Although one year of physics (PHYS11/21 and 12/22) 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:**

Course	Number of Credits	Semester and Year Completed
MMG 211: Prokaryotic Molecular Genetics	3	
MMG 222: Advanced Medical Microbiology	4	
MMG 230: 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.

Course	Number of Credits	Semester and Year Completed
MMG 114: Vaccines: Science & Ethics	3	
MMG 201: Molecular Cloning Lab	3	
MMG 203: Mammalian Cell & Molecular Biology Lab	4	
MMG 207: Biochemistry Laboratory	2	
MMG 220: Environmental Microbiology	3	
MMG 223: Immunology	3	
MMG 225: Eukaryotic Virology	3	
MMG 296 (227): Cancer Genetics	3	
MMG 231: Bioinformatics and Data Analysis	3	
MMG 232: Advanced Bioinformatics	3	
MMG 233: Genetics & Genomics	3	
MMG 235: Bioterrorism	3	
MMG 320*: Cellular Microbiology	4	
MMG 352*: Protein: Nucleic Acid Interactions	3	

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

Course	Number of Credits	Semester and Year Completed
MMG 195,196: Special Topics (Internships; Teaching Assistants)	variable	
MMG 197,198: Undergraduate Research	variable	
MMG 295,296: Special Topics	variable	
MMG 295,296: Special Topics (Internships; Teaching Assistants)	variable	
MMG 297,298: Advanced Undergraduate Research	variable	
ASCI 216: Endocrinology	3	
BIOL 223: Developmental Biology	3	
BIOL 261: Neurobiology	3	
MLS 255: Clinical Microbiology II	4	
BHSC 242: Immunology	3	
BHSC 244: Immunology Lab	1	
NFS 203/295: Food Microbiology	4 <u>or</u> 3	
PHRM 201: Introduction to Pharmacology	3	
PHRM 240: Molecules and Medicine	3	
PHRM 272: Toxicology	3	
PHRM 290: Topics in Molecular & Cell Pharmacology	3	
XXX 200+: 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:**

Courses	Number of Credits	Semester and Year Completed
MMG 201: Molecular Cloning Lab	3	
MMG 296 (227): Cancer Genetics	3	
MMG 233: Genetics & Genomics	3	

9 credits from these MMG courses:

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

Courses	Number of Credits	Semester and Year Completed
MMG 114: Vaccines: Science & Ethics	3	
MMG 203: Mammalian Cell & Molecular Biology Lab	4	
MMG 207: Biochemistry Laboratory	2	
MMG 220: Environmental Microbiology	3	
MMG 222: Advanced Medical Microbiology	4	
MMG 223: Immunology	3	
MMG 225: Eukaryotic Virology	3	
MMG 230: Adv. Studies in Emerging Infectious Diseases (D2, SU)	3	
MMG 231: Bioinformatics and Data Analysis	3	
MMG 232: Advanced Bioinformatics	3	
MMG 233: Genetics & Genomics	3	
MMG 235: Bioterrorism	3	
MMG 320*: Cellular Microbiology	4	
MMG 352*: 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
MMG 195,196: Special Topics (Internships; Teaching Assistants)	variable	
MMG 197,198: Undergraduate Research	variable	
MMG 295,296: Special Topics	variable	
MMG 295,296: Special Topics (Internships; Teaching Assistants)	variable	
MMG 297,298: Advanced Undergraduate Research	variable	
ASCI 216: Endocrinology	3	
BIOL 223: Developmental Biology	3	
BIOL 261: Neurobiology	3	
MLS 255: Clinical Microbiology II	4	
BHSC 242: Immunology	3	
BHSC 244: Immunology Lab	1	
NFS 203/295: Food Microbiology	4 <u>or</u> 3	
PHRM 201: Introduction to Pharmacology	3	
PHRM 240: Molecules and Medicine	3	
PHRM 272: Toxicology	3	
PHRM 290: Topics in Molecular & Cell Pharmacology	3	
XXX 200+: 200-level course in Life Sciences (by permission of MMG advisor)	variable	

MMG COURSE OFFERINGS BY SEMESTER AND YEAR

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

MMG 001	First-Year Colloquium	Every Fall
MMG 002 (SU)	Unseen Worlds – Microbes and You	Every Fall
MMG 095	Bioprospecting: Drugs from Bugs	Every Spring
MMG 101	Microbiology and Infectious Disease	Every Fall
MMG 104	Introduction to Recombinant DNA Technology	Every Spring
MMG 106	Introduction to Biomedical Research Methods	Every Spring
MMG 114	Vaccines: Science & Ethics	Every Spring
MMG 193/195	Special Topics (Internships; Teaching Assistants)	Every Fall/Spring
MMG 197/198	Undergraduate Research	Every Fall/Spring
MMG 201	Molecular Cloning & Cell Culture Lab	Every Fall
MMG 205	Biochemistry I	Every Fall
MMG 206	Biochemistry II	Every Spring
MMG 207	Biochemistry Laboratory & Discussion	Every Spring
MMG 211	Prokaryotic Molecular Genetics	Every Fall
MMG 220	Environmental Microbiology	Spring, Even Years
MMG 222	Advanced Medical Microbiology	Every Spring
MMG 223	Immunology	Spring, Odd Years
MMG 225	Eukaryotic Virology	Fall, Even Years
MMG 296 (227)	Cancer Genetics	Spring, Odd Years
MMG 230 (D2, SU)	Advanced Studies in Emerging Infectious Diseases	Fall, Odd Years
MMG 231	Bioinformatics and Data Analysis	Every Fall
MMG 232	Advanced Bioinformatics	Spring, Odd Years
MMG 233	Genetics and Genomics	Every Fall
MMG 235	Bioterrorism	Spring, Odd Years
MMG 240	Macromolecular Structures of Proteins & Nucleic Acids	Spring, Even Years
MMG 293	Advanced Special Topics (Internships; TAs)	Every Fall/Spring
MMG 295	Advanced Special Topics	Every Fall/Spring
MMG 297/298	Advanced Undergraduate Research	Every Fall/Spring
MMG 299	Senior Seminar	Every Fall/Spring
MMG 320*	Cellular Microbiology	Spring, Even Years
MMG 352*	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:

Courses	Number of Credits	Semester and Year Completed
MMG 201: Molecular Cloning Lab	4	
MMG 211: Prokaryotic Molecular Genetics	3	
MMG 222: Advanced Medical Microbiology	4	
MMG 296 (227): Cancer Genetics	3	
MMG 230: Advanced Studies in Emerging Infectious Diseases (D2, SU)	3	
MMG 233: 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
MMG 101: Microbiology & Infectious Disease	4	
MMG 104: Introduction to Recombinant DNA Technology	3	
BCOR 101: Genetics <u>or</u> BCOR 103/MMG 196: Molecular Cell Biology	4 <u>or</u> 3	
<u>9</u> additional credits of MMG 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
MMG 106: Introduction to Biomedical Research Methods	3	
MMG 231: Bioinformatics & Data Analysis	3	
MMG 232: Advanced Bioinformatics	3	
MMG 233: Genetics and Genomics	3	
<u>+6</u> additional credits from the following courses:	6	
MMG 197/198: Undergraduate Research	1-3	
MMG 211: Prokaryotic Molecular Genetics	3	
CS 124: Data Structures and Algorithms	3	
CS 254: Machine Learning	3	
STAT 087: Introduction to Data Science	3	
STAT 200: Medical Biostatistics & Epidemiology	3	
STAT 201: Statistical Computing & Data Analysis	3	

The following descriptions are intended only as examples.

MICROBIOLOGY (MICR) MAJORS

FALL

FIRST YEAR

BCOR 11	4 credits
CHEM 31	4 credits
MATH 19 or 21	3 (4) credits
MMG 001	1 credit
MMG 002 (SU)	3 credits

SECOND YEAR

CHEM 141 or 143	4 credits
MMG 101	4 credits
BCOR 101	3 credits
ENGS 002	3 credits

THIRD YEAR

BIOC 201	3 credits
MMG 201 or 225	3 credits
Elective (Soc. Sci.)	3 credits
STAT 141/200	3 credits
Elective (Fine Arts)	3 credits

FOURTH YEAR

MMG 211	3 credits
PHYS 11 or 51/21	5 credits (Pre-Med; Pre-Grad)
MMG 230	3 credits
Elective (Fine Arts)	3 credits
MMG 197/297	3 (var) credits

SPRING

BCOR 12	4 credits
CHEM 32	4 credits
MATH 20 or 22	3 (4) credits
CALS 002	3 credits
Elective (D1)	3 credits

CHEM 142 or 144	4 credits
BCOR 103/MMG 196C	4-3 credits
MMG 104	3 credits
MMG 106	3 credits
CALS 183	3 credits

MMG 235	3 credits
MMG 220	4 credits
MMG 198	3 (var) credits
Elective (D2)	3 credits
Elective (Soc. Sci.)	3 credits

MMG 222	4 credits
PHYS 12 or 42/22	5 credits
MMG 198/298	3 (var) credits
MMG 223	3 credits
MMG 299	1 credit

If one is interested in pursuing a **clinically oriented microbiology career**, consider the following electives: **MMG 230, MMG 222, and MLS 255** are absolutely essential. Also, **MMG 197/297 and 198/298, MMG 203, MMG223/MLRS 242, MMG 225, and MMG 201** are strongly suggested.

If one is interested in pursuing an **applied microbiology career**, consider the following electives: **MMG 201 and NFS 203** are absolutely essential. Also, **MMG 203, MMG 220, MMG 222, MLS 255, MMG223/MLRS 242, and MMG 235** are strongly suggested.

If one is interested in pursuing a **general microbiology experience**, consider the following courses: **MMG 201, MMG 220, MMG 222, MMG230, MLS 255, MMG223/MLRS 242, and MMG 225** 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 11	4 credits
CHEM 31	4 credits
MATH 19 or 21	3 (4) credits
MMG 001	1 credit
MMG 002 (SU)	3 credits

SPRING

BCOR 12	4 credits
CHEM 32	4 credits
MATH 20 or 22	3 (4) credits
CALS 002	3 credits
Elective (D1)	3 credits

SECOND YEAR

CHEM 141 or 143	4 credits
MMG 101	4 credits
BCOR 101	3 credits
ENGS 001	3 credits

CHEM 142 or 144	4 credits
BCOR 103/MMG 196C	4-3 credits
MMG 104	3 credits
MMG 106	3 credits
CALS 183	3 credits

THIRD YEAR

MMG 205	3 credits
MMG 201 or 225	3 credits
Elective (Soc. Sci.)	3 credits
STAT 141/200	3 credits
Elective (Fine Arts)	3 credits

MMG 206	3 credits
MMG 198	3 (var) credits
MMG 232	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 197/297	3 (var) credits
MMG 233	3 credits
MMG 201 or 225	3 credits

PHYS 12 or 42/22	5 credits
MMG 198/298	3 (var) credits
MMG 203	4 credits
Elective (Fine Arts)	3 credits
MMG 299	1 credit