SPECIAL REPORT

OF THE

ACADEMIC MATTERS COUNCIL

concerning

REVISION TO THE
BS IN MICROBIOLOGY
(#4734)

Presented at the
783rd Regular Meeting of the Faculty Senate
January 24 2019

COUNCIL MEMBERSHIP

ACADEMIC MATTERS COUNCIL

Wesley Autio, Carol Barr, Brian Beck, William Brown, Allison Butler, D. Anthony Butterfield, Marcy Clark, Elizabeth Connor, Sharon Domier, Wei Fan, Diane Flaherty, Laura Francis, Mark Guerber, Jennifer Heuer, Maeve Howett, Chair, Patrick Kelly, Kathryn Lachman, Meredith Lind, Linda Lowry, Roberta Marvin, Ernest May, Eric Moschella, Ruthann Paradise, Sarah Pfatteicher, Jennifer Randall, MJ Peterson, Kregg Strehorn, Patrick Sullivan, Jack Wileden, Rebecca Woodland, and Kate Woodmansee

ACADEMIC MATTERS COUNCIL

The Academic Matters Council recommends approval of this proposal.

Briefly describe the Proposal

The proposal seeks to increase the Microbiology core requirements by 8 credit hours of upper-level electives (courses numbered 300 or above), resulting in a total of 35 credit hours of core Microbiology courses to fulfill the requirements for the BS degree in Microbiology. Also, clarifies that only BIOCHEM 420 meets our Biochemistry requirement (prevent BIO 285 from populating BIOCHEM 420 in ARR's).

Please describe the existing program requirements, listing all required courses and available electives, as well as any additional requirements, and continuation or admissions policies.

All Microbiology majors will require fulfilling the following foundational courses:
BIO 151*, 152*, and 153  
CHEM 111*, 112*, 261*, 262, and 269  
MATH 127 and MATH 128 (or STATS 240)  
PHYSICS 131 and 132  
BIOCHEM 420

*Minimal grade of C- or higher required. Note BIO 151 requires a C to progress to BIO 152 and 153.

A total of 27 credits must be met by Microbiology courses numbered 300 or higher. These must consist of the required Microbiology core courses and at least two Laboratory Elective courses.

The Microbiology core courses consist of the following:
MICROBIO 310 - General Microbiology (3cr)**  
MICROBIO 312 - General Microbiology Lab for majors only (3cr)**  
MICROBIO 320 - Infectious Disease and Defense (3cr)  
MICROBIO 330 - Microbial Genetics (3cr)  
MICROBIO 360 - Junior Year Writing (3cr)  
MICROBIO 480 - Microbial Physiology and Diversity (3cr)  
3 credits of Integrative Experience (3 X MICROBIO 494I courses - each is a 1 credit course).

** B- or better required in MICROBIO 310 to enroll in MICROBIO 320, MICROBIO 330, and MICROBIO 480; Likewise, B- or better required in MICROBIO 312 to enroll in MICROBIO 385, MICROBIO 542, MICROBIO 552, MICROBIO 562, MICROBIO 565, MICROBIO 590L.

Additionally, the degree requires two Lab Electives chosen from approximately 11 lab-based courses offered in CNS. Five of these courses are offered by Microbiology and include:

MICROBIO 385 - Introduction to Biotechnology Laboratory (4cr)  
MICROBIO 497L - ST-Advanced Microbiology Lab Techniques (3)  
MICROBIO 542 - Immunology (3cr)  
MICROBIO 552 - Pathogenic Bacteriology (3cr)  
MICROBIO 562 - Environmental Biotechnology (3cr)  
MICROBIO 565 - Laboratory in Molecular Genetics (4cr)

Only 3 credits of Independent Study (396IS) may be applied to the 27 credit requirement. These 3 credits can replace one Lab Elective if the following conditions are met: 2 semesters of IS with the same faculty exists prior to the request to meet the Lab Elective requirement (total of 3 MICROBIO 396IS courses must be taken).

Courses offered by other departments that can meet Lab Elective requirements include:

BIO 383H - Gene and Genome Analysis sp  
BIO 477H - BioImaging  
FOOD SCI 566 - Food Microbiology Lab  
STOCKSCH 505 - General Plant Pathology  
STOCKSCH 525 - Mycology
In total, the Microbiology degree requires 88 credits.

*Please describe the requirements that you are proposing, listing course requirements, elective options, as well as any additional requirements, and continuation or admissions policies.*

All Microbiology majors will require fulfilling the following foundational courses:

- **BIO** 151*, 152*, and 153
- **CHEM** 111*, 112*, 261*, 262, and 269
- **MATH** 127 and **MATH** 128 (or **STATS** 240)
- **PHYSICS** 131 and 132
- **BIOCHEM** 420

*Minimal grade of C- or higher required. Note **BIO** 151 requires a C to progress to **BIO** 152 and 153.*

A total of 35 credits must be met by Microbiology courses numbered 300 or higher. These must consist of the required Microbiology core courses and at least two Laboratory Elective courses.

The Microbiology core courses consist of the following:

- **MICROBIO** 310 - General Microbiology (3cr)**
- **MICROBIO** 312 - General Microbiology Lab for majors only (3cr)**
- **MICROBIO** 320 - Infectious Disease and Defense (3cr)
- **MICROBIO** 330 - Microbial Genetics (3cr)
- **MICROBIO** 360 - Junior Year Writing (3cr)
- **MICROBIO** 480 - Microbial Physiology and Diversity (3cr)
- 3 credits of Integrative Experience (3 X **MICROBIO** 494I courses - each is a 1 credit course).

**C or better required in **MICROBIO** 310 to enroll in **MICROBIO** 320, **MICROBIO** 330, and **MICROBIO** 480; Likewise, C or better required in **MICROBIO** 312 to enroll in **MICROBIO** 385, **MICROBIO** 542, **MICROBIO** 552, **MICROBIO** 562, **MICROBIO** 565, and **MICROBIO** 590L.

Courses that meet the major Lab Elective requirement are:

- **MICROBIO** 385 - Introduction to Biotechnology Laboratory (4cr)
- **MICROBIO** 497L - ST-Advanced Microbiology Lab Techniques (3)
- **MICROBIO** 542 - Immunology (3cr)
- **MICROBIO** 552 - Pathogenic Bacteriology (3cr)
- **MICROBIO** 562 - Environmental Biotechnology (3cr)
- **MICROBIO** 565 - Laboratory in Molecular Genetics (4cr)

Only 3 credits of Independent Study (396IS) may be applied to the 35 credit requirement. These 3 credits can replace one Lab Elective if the following conditions are met: 2 semesters of IS with the same faculty exists prior to the request to meet the Lab Elective requirement (total of 3 **MICROBIO** IS courses must be taken).
In addition, the department has approved the following courses to meet the two lab elective requirements. As such, no more than two of the following can contribute to the 35 Microbiology credits required for the degree.

BIO 383H - Gene and Genome Analysis sp
BIO 477H - BioImaging
FOOD SCI 566 - Food Microbiology Lab
STOCKSCH 505 - General Plant Pathology
STOCKSCH 525 - Mycology

The following courses may act as electives to meet the 35 Microbiology credits required for a Microbiology degree. Microbiology lab courses not used to meet lab elective requirement may act as electives as well.

MICROBIO 440 - Microbial Ecology and Evolution
MICROBIO 444 - Biodeteriation, Bioconversion, and Bioenergy
MICROBIO 450 - Outbreaks
MICROBIO 570 - Virology
MICROBIO 590S - Parasitology
ANIMLSCI 572 - Infection and Immunity
ENVIRSCI/STOCKSCH 515 - Microbiology of Soil
FOOD SCI 567 - Food Microbiology
FOOD SCI 580 - Foodborne Disease
PUBHLTH 324 - Intro to Epidemiology***
PUBHLTH 223 - Intro to Biostats****

***Students pursuing two majors in Public Health and Microbiology can only apply two courses to meet requirements in both degrees.

Other courses may be considered to meet elective credits once given approval by undergraduate advisor and department curriculum committee.

The proposed total requirements for Microbiology BS degree is 96 credits.

Please provide the rationale for these revisions.

In order to foster enduring understanding of core microbiology concepts as proposed by the American Society of Microbiology curriculum guidelines for undergraduate microbiology majors, our students need to deepen their experiences through more upper-level electives. The committee proposes an increase of 8 credits to the major requirements through a variety of upper-level electives, totaling 35 credits. This is better aligned with science majors here at UMass like Biology and Chemistry, which require 37 core credits.

Academic Requirements Review

[Text, which is an extended set of computer coding of current requirements, omitted.]
Resources

If this proposal requires no additional resources, say so and briefly explain why. If this proposal requires additional resources, explain how they will be paid for. For proposals involving instruction, indicate how many new enrollments are expected and whether the courses have room to accommodate them.

Microbiology elective courses currently exit and recently two new courses have been created (MICROBIO 444 and MICROBIO 450). Currently Microbiology students will already enroll in suggested courses offered in different departments (e.g. ANIMLSCI 572 and FOODSCI 567). We would like to provide that flexibility but expect departmental electives will be the preferred courses.

MOTION: That the Faculty Senate approve the Revision to the BS in Microbiology, as presented in Sen. Doc. No. 19-035.