MICHIGAN STATE UNIVERSITY  
University Committee on Curriculum  
SUBCOMMITTEE A – AGENDA  

Via Zoom  
October 14, 2021  
1:30 p.m.  

PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES  

COLLEGE OF NATURAL SCIENCE  

1. Request to change the requirements for the Bachelor of Science degree in Human Biology in the College of Natural Science.  
   a. Under the heading Requirements for the Bachelor of Science Degree in Human Biology make the following changes:  
      (1) Delete item 3. a. (4).  
      (2) Add the following item 3. g. (3):  
          PHY 221 Studio Physics for Life Scientists I 4  
          PHY 222 Studio Physics for Life Scientists II 4  
      (3) Renumber items 3. g. (3), (4), and (5) to 3. g. (4), (5), and (6) respectively.  
      (4) In item 3. i., delete the following courses:  
          IBIO 483 Environmental Physiology (W) 4  
          NSC 496 Directed Study in Human Biology 1 to 3  
          NSC 497 Internship in Human Biology 1 to 3  
          NSC 498 Research in Human Biology 1 to 3  
   Effective Spring 2022.  

2. Request to change the requirements for the Bachelor of Science degree in Environmental Biology/Microbiology in the Department of Microbiology and Molecular Genetics.  
   a. Under the heading Requirements for the Bachelor of Science Degree in Environmental Biology/Microbiology replace item 3. with the following:  
      a. The following courses outside the Department of Microbiology and Molecular Genetics (59 or 68 credits):  
         (1) One of the following, either a. or b. (4 or 6 credits):  
             (a) BMB 461 Advanced Biochemistry I 3  
             (b) BMB 462 Advanced Biochemistry II 3  
             (b) BMB 401 Comprehensive Biochemistry 4  
         (2) All of the following courses (18 credits):  
             CSS 210 Fundamentals of Soil Science 3  
             ENE 280 Principles of Environmental Engineering and Science 3  
             GLG 201 The Dynamic Earth 4  
             GLG 421 Environmental Geochemistry 4  
             IBIO 355 Ecology 3  
             IBIO 355L Ecology Laboratory (W) 1  
         (3) One of the following groups of courses (6 or 9 credits):  
             (a) BS 161 Cell and Molecular Biology 3  
             BS 162 Organismal and Population Biology 3  
             (b) LB 144 Biology I: Organismal Biology 4  
             LB 145 Biology II: Cell and Molecular Biology 5  
             (c) BS 181H Honors Cell and Molecular Biology 3  
             BS 182H Honors Organismal and Population Biology 3  
         (4) One of the following courses (2 credits):  

BS 171 Cell and Molecular Biology Laboratory 2
BS 172 Organismal and Population Biology Laboratory 2
BS 191H Honors Cell and Molecular Biology Laboratory 2
BS 192H Honors Organismal and Population Biology Laboratory 2
This requirement is waived for students who selected item (3) (b) above

(5) One of the following groups of courses (9 or 10 credits):
(a) CEM 141 General Chemistry 4
CEM 142 General and Inorganic Chemistry 3
CEM 161 Chemistry Laboratory I 1
CEM 162 Chemistry Laboratory II 1
(b) LB 171 Principles of Chemistry I 4
LB 172 Principles of Chemistry II 4
LB 171L Introductory Chemistry Laboratory I 1
LB 172L Principles of Chemistry II – Reactivity Laboratory 1
(c) CEM 151 General and Descriptive Chemistry 4
CEM 152 Principles of Chemistry 3
CEM 161 Chemistry Laboratory I 1
CEM 162 Chemistry Laboratory II 1
(d) CEM 181H Honors Chemistry I 4
CEM 182H Honors Chemistry II 4
CEM 185H Honors Chemistry Laboratory 2

(6) One of the following groups of courses (8 credits):
(a) CEM 251 Organic Chemistry I 3
CEM 252 Organic Chemistry II 3
CEM 255 Organic Chemistry Laboratory 2
(b) CEM 351 Organic Chemistry I 3
CEM 352 Organic Chemistry II 3
CEM 355 Organic Chemistry Laboratory I 2

(7) One of the following (3 or 4 credits):
MTH 132 Calculus I 3
LB 118 Calculus I 4
MTH 152H Honors Calculus I 3

(8) One of the following (3 credits):
STT 231 Statistics for Scientists 3
STT 421 Statistics I 3
MTH 133 Calculus II 3

(9) One of the following groups of courses (6 or 8 credits)
(a) PHY 231 Introductory Physics I 3
PHY 232 Introductory Physics II 3
(b) PHY 241 Physics for Cellular and Molecular Biologists I 4
PHY 242 Physics for Cellular and Molecular Biologists II 4
(c) PHY 183 Physics for Scientists and Engineers I 4
PHY 184 Physics for Scientists and Engineers II 4
(d) LB 273 Physics I 4
LB 274 Physics II 4
(e) PHY 193H Honors Physics I-Mechanics 4
PHY 294H Honors Physics II- Electromagnetism 4

b. The following courses in the Department of Microbiology and Molecular Genetics (19 credits):
(1) All of the following courses (13 credits):
MMG 301 Introductory Microbiology 3
MMG 302 Introductory Laboratory for General and Allied Health Microbiology 1
MMG 421 Prokaryotic Cell Physiology 3
MMG 425 Microbial Ecology 3
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MMG 431 Microbial Genetics 3

(2) One of the following courses (3 credits):
- MMG 408 Advanced Microbiology Laboratory (W) 3
- MMG 494 Summer Undergraduate Research Institute in Genomics (W) 3

(3) One of the following two options (3 credits):
(a) MMG 491 Current Topics in Microbiology and Molecular Genetics 3
(b) MMG 492 Undergraduate Research Seminar 1

One of the following courses:
- MMG 499 Undergraduate Research 2
- MMG 499H Honors Research 2
(c) MMG 493 Professional Internship in Microbiology and Molecular Genetics 3

The completion of either of these three options fulfills the department's capstone course requirement.

c. One course from two of the following areas (6 to 8 credits):
(1) CSS 455 Pollutants in the Soil Environment 3
(2) FOR 340 Forest Ecology 3
- PLB 402 Biology of Fungi 4
(3) FSC 440 Food Microbiology 3
(4) GEO 206 Physical Geography 3
- GEO 221 Introduction to Geographic Information 3
(5) GLG 435 Geomicrobiology 4
(6) MMG 445 Microbial Biotechnology (W) 3
(7) FOR 466 Natural Resource Policy 3
- IBIO 446 Environmental Issues and Public Policy 3
(8) FW 420 Stream Ecology 3
- FW 472 Limnology 3
(9) MMG 433 Microbial Genomics 3
- PLB 400 Introduction to Bioinformatics 3
(10) IBIO 357 Global Change Biology (W) 3

Effective Spring 2022.

3. Request to change the requirements in the Bachelor of Science degree in Genomics and Molecular Genetics in the Department of Microbiology and Molecular Genetics.

a. Under the heading Requirements for the Bachelor of Science Degree in Microbiology and Molecular Genetics make the following changes:

(1) In item 3. a. (4) (d) delete the following course:
- CEM 186H Honors Chemistry Laboratory II 2

(2) In item 3. a. (6) delete the following course:
- ZOL 341 Fundamental Genetics 4

Add the following course:
- IBIO 341 Fundamental Genetics 4

(3) Replace item 3. a. (7) with the following:

One of the following groups of courses (6 to 8 credits)
(a) PHY 231 Introductory Physics I 3
- PHY 232 Introductory Physics II 3
(b) LB 273 Physics I 4
- LB 274 Physics II 4
(c) PHY 183 Physics for Scientists and Engineers I 4
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 184</td>
<td>Physics for Scientists and Engineers II</td>
<td>4</td>
</tr>
<tr>
<td>PHY 193H</td>
<td>Honors Physics I – Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHY 294H</td>
<td>Honors Physics II – Electromagnetism</td>
<td>4</td>
</tr>
<tr>
<td>PHY 241</td>
<td>Physics for Cellular and Molecular Biologists I</td>
<td>4</td>
</tr>
<tr>
<td>PHY 242</td>
<td>Physics for Cellular and Molecular Biologists II</td>
<td>4</td>
</tr>
</tbody>
</table>

4) In item 3. b. make the following changes:

(a) Change the total credits from '19' to '19 to 20'.

(b) In item (2) change the total credits from '3' to '3 or 4'.

(c) In item (2) change the credits of 'MMG 334' from '3' to '4'.

(d) In item (2) add the following course:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMG 494</td>
<td>Summer Undergraduate Research Institute in Genomics (W)</td>
<td>3</td>
</tr>
</tbody>
</table>

5) Change item 3. b. (3) to the following:

One of the following three options (3 credits):

(a) MMG 491 Current Topics in Microbiology and Molecular Genetics | 3

(b) MMG 492 Undergraduate Research Seminar | 1

One of the following courses:

MMG 499 Undergraduate Research | 2
MMG 499H Honors Research | 2

(c) MMG 493 Professional Internship in Microbiology and Molecular Genetics | 3

The completion of Microbiology 491, 493; or Microbiology 492 and 499 or 499H, fulfills the department’s capstone course requirement.

6) In item 3. c. delete the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSS 441</td>
<td>Plant Breeding and Biotechnology</td>
<td>3</td>
</tr>
<tr>
<td>PLB 400</td>
<td>Introduction to Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td>ZOL 445</td>
<td>Evolution (W)</td>
<td>3</td>
</tr>
</tbody>
</table>

Add the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANS 404</td>
<td>Introduction to Quantitative Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CMSE 201</td>
<td>Computational Modeling and Data Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>CMSE 202</td>
<td>Computational Modeling and Data Analysis II</td>
<td>4</td>
</tr>
<tr>
<td>CMSE 410</td>
<td>Bioinformatics and Computational Biology</td>
<td>3</td>
</tr>
<tr>
<td>CMSE 411</td>
<td>Computational Medicine</td>
<td>3</td>
</tr>
<tr>
<td>CSS 451</td>
<td>Biotechnology Applications for Plant Breeding and Genetics</td>
<td>3</td>
</tr>
<tr>
<td>IBIO 445</td>
<td>Evolution (W)</td>
<td>3</td>
</tr>
</tbody>
</table>

Effective Spring 2022.
4. Request to change the requirements in the Bachelor of Science degree in Microbiology in the Department of Microbiology and Molecular Genetics.

   a. Under the heading Requirements for the Bachelor of Science Degree in Microbiology make the following changes:

   (1) In item 3. a. (4) (d) delete the following course:
       CEM 186H Honors Chemistry Laboratory II     2

   (2) In item 3. a. (6) change the total credits from '8 to 10' to '6 to 8'.

   (3) In item 3. a. (6) (a) delete the following courses:
       PHY 251 Introductory Physics Laboratory I     1
       PHY 252 Introductory Physics Laboratory II    1

   (4) In item 3. a. (6) (c) delete the following courses:
       PHY 191 Physics Laboratory for Scientists, I     1
       PHY 192 Physics Laboratory for Scientists, II    1

   (5) In item 3. a. (6) (d) delete the following courses:
       PHY 191 Physics Laboratory for Scientists, I     1
       PHY 192 Physics Laboratory for Scientists, II    1

   (6) Add item 3. a. (6) (e):
       PHY 241 Physics for Cellular and Molecular Biologists I  4
       PHY 242 Physics for Cellular and Molecular Biologists II   4

   (7) In item 3. b. (1) change the total credits from ’13’ to ’10’ and delete the following course:
       MMG 408 Advanced Microbiology Laboratory (W)   3

   (8) Renumber item 3. b. (2) to item 3. b. (3).

   (9) Add a new item 3. b. (2):
       One of the following courses (3 credits):
       MMG 408 Advanced Microbiology Laboratory (W)   3
       MMG 494 Summer Undergraduate Research Institute in Genomics (W)   3

   (10) Change item 3. b. (3) to the following:
       One of the following, either (a), (b), or (c) (3 credits):
       (a) MMG 491 Current Topics in Microbiology and Molecular Genetics    3
       (b) MMG 492 Undergraduate Research Seminar    1
           and
           One of the following courses:
           MMG 499 Undergraduate Research     2
           MMG 499H Honors Research     2
       (c) MMG 493 Professional Internship in Microbiology and Molecular Genetics    3
       The completion of Microbiology 491, 493, or Microbiology 492 and 499 or 499H, fulfills the department’s capstone course requirement.

   (11) In item 3. c. delete the following course:
       MMG 463 Medical Microbiology   3
Add the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMG 365</td>
<td>Medical Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>MMG 465</td>
<td>Advanced Medical Microbiology</td>
<td>3</td>
</tr>
</tbody>
</table>

Effective Spring 2022.

5. Request to change the requirements in the Doctor of Philosophy degree in Microbiology and Molecular Genetics in the Department of Microbiology and Molecular Genetics. The University Committee on Graduate Studies (UCGS) will consider this request at its October 18, 2021 meeting.

a. Under the heading Admission replace the entire entry with the following:

Admission to the Doctor of Philosophy degree in Microbiology and Molecular Genetics is through the BioMolecular Science Gateway – First Year (BMS). The successful applicant will typically have: a bachelor’s degree (four-year or equivalent) or Master of Science degree that includes course work that demonstrates proficiency in math and science; a grade point average of 3.50 or above; significant research experience equivalent to a minimum of one full-time summer research experience or four semesters of part-time research experience; and strong letters of reference.

b. Under the heading Requirements for the Doctor of Philosophy Degree in Microbiology and Molecular Genetics replace the entire entry with the following:

The student must:
1. Complete a minimum of four graduate courses (excluding topics and seminar courses) covering the areas of genetics, microbiology, and biochemistry. At least two of these courses must be offered by the Department of Microbiology and Molecular Genetics.
   a. One course must focus on Molecular Biology or Genetics and include one of the following courses or an approved equivalent as approved by the Director of Graduate Studies.
      
      | Course Code | Course Name                  | Credits |
      |-------------|------------------------------|---------|
      | BMB 801     | Molecular Biology            | 3       |
      | MMG 833     | Microbial Genetics           | 3       |
      | MMG 835     | Eukaryotic Molecular Genetics| 3       |

   b. One course must focus on Cell Biology or Cell Physiology and include one of the following courses or an approved equivalent as approved by the Director of Graduate Studies.
      
      | Course Code | Course Name                  | Credits |
      |-------------|------------------------------|---------|
      | BMB 802     | Metabolic Regulation and Signal Transduction | 3       |
      | MMG 801     | Integrative Microbial Biology | 4       |
      | MMG 825     | Cell Structure and Function   | 3       |

   c. Other approved course electives include:
      
      | Course Code | Course Name                  | Credits |
      |-------------|------------------------------|---------|
      | BMB 803     | Protein Structure and Function| 2       |
      | BMB 805     | Protein Structure, Design, and Mechanism | 3       |
      | MMG 813     | Molecular Virology            | 3       |
      | MMG 851     | Immunology                    | 3       |
      | MMG 861     | Advanced Microbial Pathogenesis| 3       |

2. Complete three special topics graduate seminar courses (MMG 803, MMG 991 or other departmental seminar courses as approved by the Director of Graduate Studies chosen to increase the breadth and depth of knowledge in your field.

3. Pass a comprehensive examination that includes a written research proposal, public seminar and oral examination with the student's guidance committee.


5. Submit a dissertation and a publishable manuscript based on original research and representing a new and significant contribution to knowledge.

All doctoral students in microbiology and molecular genetics are required to participate in laboratory teaching through enrollment of 1 credit of MMG 892 and are expected to attend departmental seminars through enrollment in 4 credits of MMG 892. In addition, all students must participate in the Work in Progress (WiPs) seminar series.

Effective Spring 2022.
6. Request to change the requirements for the Doctor of Philosophy degree in Plant Biology in the Department of Plant Biology. The University Committee on Graduate Studies (UCGS) will consider this request at its October 18, 2021 meeting.

   a. Under the heading Requirements for the Doctor of Philosophy Degree in Plant Biology make the following changes:

      (1) In item 1. a. delete the following course:

          PLB 804 Frontiers in Plant Biology  2

      (2) Replace item 1. c. delete the following courses:

          ZOL 891 Current Topics in Ecology and Evolution  1
          ZOL 895 Seminar  1

      Add the following courses:

          IBIO 891 Current Topics in Ecology and Evolution  1
          IBIO 895 Seminar  1

   Effective Spring 2022.

   COLLEGE OF NURSING

1. Request to change the requirements for the Doctor of Philosophy degree in Nursing. The University Committee on Graduate Studies (UCGS) will consider this request at its October 18, 2021 meeting.

   a. Under the heading Requirements for the Doctor of Philosophy Degree in Nursing make the following changes:

      (1) In item 1. change the total credits from ‘66’ to ‘65’.

      (2) Under the Course Requirements in item 3., change the credits from ‘3’ to ‘1 to 3’.

   Effective Spring 2022.

   COLLEGE OF OSTEOPATHIC MEDICINE

1. Request to change the requirements for the Professional Program in Osteopathic Medicine leading to the Doctor of Osteopathic Medicine degree the College of Osteopathic Medicine. The University Committee on Graduate Studies (UCGS) will consider this request at its October 18, 2021 meeting.

   a. Under the heading Requirements for the Doctor of Osteopathic Medicine Degree make the following changes:

      (1) Under the heading PreClerkship Curriculum make the following changes:

          (a) Change the total credits from ‘98’ to ‘99’ and add the following course:

              OST 558 Pediatrics IV  1

          (b) Delete the following course:

              OST 580 Respiratory System  6

      Add the following course:

          OST 580 Respiratory System  7
(2) Under the heading **Clerkship Curriculum** make the following changes:

(a) Under the heading **Required Clinical Clerkship Core Rotation Courses** change ‘OST 653’ to ‘OSS 653’.

(b) Under the heading **Required clinical elective clerkship rotation courses** add the following courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>OST 622</td>
<td>Addiction Medicine</td>
<td>3</td>
</tr>
<tr>
<td>OST 623</td>
<td>Board Preparation</td>
<td>1 to 6</td>
</tr>
<tr>
<td>OST 624</td>
<td>Essentials in Diabetes</td>
<td>3</td>
</tr>
</tbody>
</table>

Effective Spring 2022.

**COLLEGE OF VETERINARY MEDICINE**

1. Request to change the requirements for the **Bachelor of Science** degree in **Veterinary Nursing** in the College of Veterinary Medicine.

   a. Under the heading **Admission**, in paragraph four, change item 1. to the following:

   Completion of at least 28 credits of the University graduation requirements or transfer equivalents including:

   b. Under the heading **Requirements for the Bachelor of Science Degree in Veterinary Nursing** make the following changes:

   (1) In item 1., change paragraph three to the following:

   The University’s Tier II writing requirement for the Veterinary Nursing major is met by completing the following courses: Veterinary Medicine 410 and 412. Those courses are referenced in items 2. a. below.

   (2) In item 2., change the total credits from ‘102 credits’ to ‘90 to 97 credits’.

   (3) In item 2. a. change the total credits from ‘72 credits’ to ‘75 credits’.

   (4) In item 2. a., add the following to the existent list of courses:

   and

   One of the following courses (3 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM 414</td>
<td>Veterinary Nursing Clerkship in Equine Medicine and Surgery</td>
<td>3</td>
</tr>
<tr>
<td>VM 415</td>
<td>Veterinary Nursing Clerkship in Food Animal and Equine Medicine and Surgery</td>
<td>3</td>
</tr>
<tr>
<td>VM 450</td>
<td>Veterinary Nursing Clerkship in Emergency Medicine</td>
<td>3</td>
</tr>
<tr>
<td>VM 451</td>
<td>Veterinary Nursing Clerkship in Cardiology</td>
<td>3</td>
</tr>
<tr>
<td>VM 452</td>
<td>Veterinary Nursing Clerkship in Neurology</td>
<td>3</td>
</tr>
<tr>
<td>VM 453</td>
<td>Veterinary Nursing Clerkship in Ophthalmology</td>
<td>3</td>
</tr>
<tr>
<td>VM 454</td>
<td>Veterinary Nursing Clerkship in Critical Care</td>
<td>3</td>
</tr>
<tr>
<td>VM 458</td>
<td>Veterinary Nursing Clerkship in Companion Animal Diagnostic Ultrasound</td>
<td>3</td>
</tr>
<tr>
<td>VM 466</td>
<td>Veterinary Nursing Clerkship in Large Animal Anesthesia</td>
<td>3</td>
</tr>
<tr>
<td>VM 470</td>
<td>Veterinary Nursing Clerkship in Food Animal Medicine</td>
<td>3</td>
</tr>
<tr>
<td>VM 480</td>
<td>Veterinary Nursing Clerkship in Clinical Pathology</td>
<td>3</td>
</tr>
<tr>
<td>VM 482</td>
<td>Veterinary Nursing Clerkship in Necropsy</td>
<td>3</td>
</tr>
<tr>
<td>VM 483</td>
<td>Veterinary Nursing Clerkship in Biomedical Research</td>
<td>3</td>
</tr>
<tr>
<td>VM 484</td>
<td>Veterinary Nursing Clerkship in Zoo and Wildlife Medicine</td>
<td>3</td>
</tr>
<tr>
<td>VM 486</td>
<td>Veterinary Nursing Clerkship in Clinical Parasitology</td>
<td>3</td>
</tr>
<tr>
<td>VM 490</td>
<td>Veterinary Nursing Clerkship in Special Problems</td>
<td>3</td>
</tr>
</tbody>
</table>

   (5) In item 2. b., renumber item (3) to item (4).
(6) Add the following item (3) in item 2. b.:

(3) MTH 103A College Algebra I     3
MTH 103B College Algebra II     3
and
One of the following:
MTH 101 Quantitative Literacy I     3
MTH 102 Quantitative Literacy II     3
MTH 114 Trigonometry     3
MTH 201 Elementary Mathematics for Teachers I     3
STT 200 Statistical Methods     3
STT 201 Statistical Methods     4

(7) Replace item 2. c. with the following:

One of the following options, 15 credits from Elective Group 1 or 15 credits from Elective Group 2. Courses used to satisfy requirement 2. a. above may not be used to fulfill this requirement.

(1) Veterinary Nursing Elective Group 1:
VM 414 Veterinary Nursing Clerkship in Equine Medicine and Surgery     3 to 6
VM 415 Veterinary Nursing Clerkship in Food Animal and Equine Medicine     3 to 6
VM 450 Veterinary Nursing Clerkship in Emergency Medicine     3
VM 451 Veterinary Nursing Clerkship in Cardiology     3
VM 452 Veterinary Nursing Clerkship in Neurology     3
VM 453 Veterinary Nursing Clerkship in Ophthalmology     3
VM 454 Veterinary Nursing Clerkship in Critical Care     3
VM 458 Veterinary Nursing Clerkship in Companion Animal Diagnostic Ultrasound     3
VM 466 Veterinary Nursing Clerkship in Large Animal Anesthesia     3
VM 470 Veterinary Nursing Clerkship in Food Animal Medicine     3 to 6
VM 480 Veterinary Nursing Clerkship in Clinical Pathology     3
VM 482 Veterinary Nursing Clerkship in Necropsy     3
VM 483 Veterinary Nursing Clerkship in Biomedical Research     3 to 12
VM 484 Veterinary Nursing Clerkship in Zoo and Wildlife Medicine     3 to 12
VM 486 Veterinary Nursing Clerkship in Clinical Parasitology     3
VM 490 Veterinary Nursing Clerkship in Special Problems     3 to 12

(2) Veterinary Nursing Elective Group 2. Complete 15 credits in courses from one of the following concentrations. All course selections must be approved by the Veterinary Nursing Program.

Business Communication
ACC 230 Survey of Accounting Concepts     3
AFRE 100 Decision-making in the Agri-Food System     3
AFRE 130 Farm Management I     3
AFRE 203 Data Analysis for the Agri-Food system     3
AFRE 222 Agribusiness and Food Industry Sales     3
AFRE 232 Commodity Marketing I     3
AFRE 240 Food Product Marketing     3
AFRE 315 Labor and Personnel Management in Agri-Food System     3
AFRE 327 Global Agri-Food Industries and Markets     3
AFRE 435 Financial Management in the Agri-Food System     3
COM 100 Human Communication     3
COM 225 An Introduction to Interpersonal Communication     3
COM 240 Introduction to Organizational Communication     4
EC 201 Introduction to Microeconomics     3
EC 202 Introduction to Macroeconomics     3
EAD 315 Student Leadership Training     3
FI 320 Introduction to Finance     3
HRLR 211 Introduction to Organizational Leadership 3
HRLR 311 Applied Organizational Leadership 3

**General Animal Science**

ANS 110 Introductory Animal Agriculture 3
ANS 110L Introductory Animal Agriculture Laboratory 1
ANS 134 Dairy Production I 3
ANS 200C Dairy Cattle Genetics and Evaluation 2
ANS 200E Introductory Animal Welfare Assessment 1
ANS 201 Animal Products 3
ANS 201L Animal Products Laboratory 1
ANS 210 Introduction to Disciplines in Animal Agriculture 3
ANS 211 Animal and Product Evaluation 3
ANS 222 Introductory Beef Cattle Management 3
ANS 234 Dairy Production II 3
ANS 252 Introduction to Management of Avian Species 3
ANS 262 Introductory Sheep Management 3
ANS 272 Introductory Swine Management 3
ANS 305 Applied Animal Behavior 3
ANS 305L Applied Animal Behavior Laboratory 1
ANS 307 Animal Reproduction 3
ANS 309 Animal Health and Disease Management 3
ANS 313 Principles of Animal Feeding and Nutrition (W) 4
ANS 314 Genetic Improvement of Domestic Animals (W) 4
ANS 334 Dairy Management I 3
ANS 401 Ethical Issues in Animal Agriculture 1
ANS 407 Food and Animal Toxicology 3
ANS 413 Non-Ruminant Nutrition 4
ANS 418 Animal Agriculture and the Environment 3
ANS 422 Advanced Beef Cattle Feedlot Management 3
ANS 425 Animal Biotechnology 3
ANS 427 Environmental Toxicology and Society 3
ANS 442 Advanced Horse Management 3
ANS 445 Equine Exercise Physiology 4
ANS 455 Avian Physiology 4
ANS 472 Advanced Swine Management 3
ANS 480 Animal Systems in International Development 3
ANS 483 Ruminant Nutrition 3

**General Zoo and Wildlife**

EPI 390 Disease in Society: Introduction to Epidemiology and Public Health 4
FW 101 Fundamentals of Fisheries and Wildlife Ecology and Management 3
FW 110 Conservation and Management of Marine Resources 3
FW 181 Introduction to Science, Technology, the Environment and Public Policy 3
FW 364 Ecological Problem Solving 3
FW 413 Wildlife Research and Management Techniques 3
FW 423 Principles of Fish and Wildlife Disease 3
FW 423L Principles of Fish and Wildlife Disease Laboratory 1
FW 424 Population Analysis and Management 4
FW 444 Conservation Biology 3
FW 449 Wildlife Policy 3
FW 491 Special Topics in Fisheries and Wildlife 1 to 3
IBIO 313 Animal Behavior 3
IBIO 341 Fundamental Genetics 4
IBIO 355 Ecology 3
IBIO 355L Ecology Laboratory (W) 1
IBIO 369 Introduction to Zoo and Aquarium Science 3
IBIO 408 Histology 4
IBIO 413 Laboratory in Behavioral Neuroscience (W) 4
IBIO 415 Ecological Aspects of Animal Behavior (W) 3
NEU 300 Neurobiology 3

**Sustainability and Policy**

AFRE 100 Decision-making in the Agri-Food System 3
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<td>Nature of Science</td>
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<td>International Development and Change</td>
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<td>Introduction to Environmental Sociology</td>
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<td>Food and Animal Toxicology</td>
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<td>Environmental Toxicology and Society</td>
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<td>FW 423</td>
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<td>Introductory Swine Management</td>
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<td>ANS 309</td>
<td>Animal Health and Disease Management</td>
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**Animal Products and Nutrition**

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<td>ANS 483</td>
<td>Ruminant Nutrition</td>
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Effective Spring 2022.
PART II - NEW COURSES AND CHANGES

COLLEGE OF NATURAL SCIENCE

BMB 370  Introductory Biochemistry Laboratory
Fall of every year. Spring of every year. 3(2-3) P: ((MTH 116 or LB 117) or (MTH 103 and MTH 114)) and (BS 171 or BS 191H or LB 145) and (CEM 162 or CEM 185H or LB 172L) R: Open to undergraduate students in the Biochemistry and Molecular Biology/Biotechnology Major or in the Biochemistry and Molecular Biology major or in the Lyman Briggs Biochemistry and Molecular Biology Coordinate Major or in the Lyman Briggs-Biochemistry/Biotechnology Coordinate Major or approval of department.
NEW  Basic quantitative laboratory introducing biochemical methods and principles for the study of proteins and nucleic acids and data analysis.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer 2022

BMB 470  Advanced Molecular Biology Laboratory
Fall of every year. 4(2-4) P: CEM 262 and BMB 461 P: BMB 370 and BMB 461 RB: BMB 462 R: Open to students in the Biochemistry and Molecular Biology/Biotechnology Major or in the Biochemistry and Molecular Biology major or in the Lyman Briggs Biochemistry and Molecular Biology Coordinate Major or in the Lyman Briggs-Biochemistry/Biotechnology Coordinate Major or approval of department.
Methods of molecular biology and the underlying principles on which these methods are based.
SA: BCH 472, BMB 472
Effective Fall 2021 Effective Fall 2023

BMB 471  Advanced Biochemistry Laboratory
Spring of every year. 4(2-4) P: BMB 461 and CEM 362 and CMSE 201 P: BMB 370 and BMB 461 and CMSE 201 R: Open to students in the Biochemistry and Molecular Biology/Biotechnology Major or in the Biochemistry and Molecular Biology major or in the Lyman Briggs Biochemistry and Molecular Biology Coordinate Major or in the Lyman Briggs-Biochemistry/Biotechnology Coordinate Major or approval of department.
Biochemical methods and principles used in the study of enzymes (proteins), carbohydrates, lipids, and cell organelles.
SA: BCH 471
Effective Spring 2022 Effective Fall 2023

BMB 829  Methods of Macromolecular Analysis and Synthesis
Special Problems in Macromolecular Analysis and Synthesis
Fall of every year. 2(2-0) 1 credit. A student may earn a maximum of 5 credits in all enrollments for this course. RB: BMB 462 or concurrently RB: (BMB 461 and BMB 462) or or equivalent background is recommended
SA: BCH 829
Effective Fall 2001 Effective Fall 2022

MTHE 999  Doctoral Dissertation Research
Fall of every year. Spring of every year. Summer of every year. 1 to 24 credits. A student may earn a maximum of 5 credits in all enrollments for this course. A student may earn a maximum of 86 credits in all enrollments for this course. RB: MTHE 926 and MTHE 927 and MTHE 954
Doctoral dissertation research.
Request the use of the Pass-No Grade (P-N) system.
SA: SME 999
Effective Summer 2014 Effective Fall 2021
MMG 433  **Microbial Genomics**  
Genomics (W)  
Spring of every year. 3(3-0) P: (MMG 431) P: MMG 431 RB: (MMG 421 or BMB 461) and CSE 101  
Effective Fall 2015 Effective Summer 2021

MMG 493  Professional Internship in Microbiology & Molecular Genetics  
Fall of every year. Spring of every year. Summer of every year. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. P: Completion of Tier I Writing Requirement RB: Students must apply for and be hired in a department-approved internship before enrolling in this course R: Open to sophomores or juniors or seniors in the Department of Microbiology and Molecular Genetics. Approval of department.  
NEW Off-campus capstone option involving professional work experience in a private or public sector organization related to the student’s major in the Department of Microbiology & Molecular Genetics. Students must apply and be hired by an organization before enrolling in this course.  
Request the use of ET-Extension to postpone grading. The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.  
Effective Summer 2021

MMG 494L  Summer Undergraduate Research Institute in Genomics (W) (W)  
Summer of every year. 3(2-12) P: (Completion of Tier I Writing Requirement) and (MMG 301 and MMG 302) RB: MMG 431 or IBIO 341 R: Open to undergraduate students in the Environmental Biology/Microbiology Major or in the Genomics and Molecular Genetics Major or in the Microbiology Major. Not open to students with credit in MMG 408 or MMG 434.  
NEW This course aims give students an authentic research experience. It would be a directed, yet independent research undertaken by the students in teams, using state-of-the-art genetic and genomic methods. Projects will include hypothesis generation, experimental design, use of advanced molecular biology techniques, data analysis and its interpretation. Students will also learn to read, understand and present scientific research papers during the Journal Club meetings. Students will communicate their research findings in written lab reports, oral presentation, or Mid-SURE. Offered first half of semester.  
Effective Summer 2021

AST 410  Senior Thesis  
Fall of every year. Spring of every year. 1 to 4 credits. A student may earn a maximum of 5 credits in all enrollments for this course. P: (AST 301) and completion of Tier I writing requirement. P: (AST 304 or AST 308) and completion of Tier I writing requirement  
Design and execute an original experiment or computation. A written and oral report of the research is required. The capstone course for undergraduate astrophysics majors, focusing on effective written and oral communication in the context of an in-depth investigation of an astronomical topic.  
Request the use of ET-Extension to postpone grading. The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.  
Effective Fall 2013 Effective Fall 2021

PLB 105  Plant Biology  
Fall of every year. Spring of every year. Summer of every year. 3(3-0)  
Plant structure, function, development, genetics, diversity and ecology. Plant structure, function, development, genetics, diversity and ecology. Offered first half of semester.  
SA: BOT 105  
Effective Fall 2014 Effective Summer 2021
COLLEGE OF OSTEOPATHIC MEDICINE

OST 625  Introduction to Military Medicine Elective
On Demand. 6 to 9 credits. A student may earn a maximum of 9 credits in all enrollments for this course. RB: Medical students on HPSP scholarship R: Open to graduate students in the College of Osteopathic Medicine.

NEW
OST 625 will provide osteopathic medical students with an introduction to military medicine.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer 2022

OST 626  Special Topics in Healthcare Ethics: Case Studies
Fall of every year. Spring of every year. Summer of every year. 3(3-0) R: Open to graduate students in the College of Osteopathic Medicine. Approval of college.

NEW
Focus is on increasing the knowledge of healthcare ethics and application to case studies. This two week clerkship rotation will explore the evaluation and critical appraisal of ethical issues in patient cases.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring 2022

OST 627  Fundamentals of Health Policy and Advocacy
Fall of every year. Spring of every year. Summer of every year. 3(3-0) R: Open to graduate students in the College of Osteopathic Medicine. Approval of college.

NEW
Focus is on increasing the knowledge of healthcare policy and advocacy. This two week rotation will explore legislative, media and organizational opportunities for physician advocacy.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring 2022