# MICHIGAN STATE UNIVERSITY

### Report of

**THE UNIVERSITY COMMITTEE ON CURRICULUM**

**to the Faculty Senate January 18, 2022**

*The effective date for new programs subject to Statewide Academic Program review is implemented in accordance with the Statewide Academic Program Review calendar.*

TO: Faculty Senate

MICHIGAN STATE UNIVERSITY

University Committee on Curriculum

January 18, 2022

This report is prepared and distributed for the following purposes:

1. To report new academic programs, changes in academic programs, discontinuations of academic programs, new courses, permanent changes in courses, and deletions of courses.
2. To notify the initiating colleges, schools, and departments of approval by the University Committee on Curriculum of their requests for new academic programs, changes in academic programs, discontinuations of academic programs, new courses, permanent changes in courses, and deletions of courses. Any items not approved by the Faculty Senate will be reported to the appropriate college and department or school.
3. To provide information to members of the faculty in each department about academic programs and courses in all colleges, departments, and schools of the University.

Reports of the University Committee on Curriculum to the Faculty Senate are organized as follows: PART I - NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES:

Organized by colleges in alphabetical order. For a given college, academic units are organized in alphabetical order. For a given academic unit, degrees, majors, and specializations are organized in alphabetical order.

PART II - NEW COURSES:1

Organized by academic units in alphabetical order; All-University courses appear last. For a given academic unit, courses are organized according to the names associated with course subject codes, in alphabetical order. Courses with the same subject code are in numerical order.

PART III - COURSE CHANGES:1

Organized by academic units in alphabetical order; All-University courses appear last. For a given academic unit, courses are organized according to the names associated with course subject codes, in alphabetical order. Courses with the same subject code are in numerical order.

Not all of the above categories, and not all of the colleges and academic units, will necessarily appear in any given Senate Report.

1One or more of the abbreviations that follow may be included in a course entry:

|  |  |  |
| --- | --- | --- |
| P: | = | Prerequisite monitored in SIS |
| C: | = | Corequisite |
| R: | = | Restriction |
| RB: | = | Recommended background |
| SA: | = | Semester Alias |

MICHIGAN STATE UNIVERSITY

January 18, 2022

TO: Faculty Senate

FROM: University Committee on Curriculum

SUBJECT: New Academic Programs and Program Changes: New Courses and Course Changes

# PART I - NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

## COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Change the requirements for **Disciplinary Teaching Minor** in **Agriculture, Food and Natural Resource Education** in the Department of Community Sustainability. The Teacher Education Council (TEC) approved this request at its November 8, 2021 meeting.
   1. Under the heading **AGRICULTURE, FOOD AND NATURAL RESOURCE EDUCATION** replace the entire entry with the following:

Students must complete:

* + 1. All of the following courses (14 credits):

|  |  |  |  |
| --- | --- | --- | --- |
| ANS | 110 | Introductory Animal Agriculture | 3 |
| CSS | 101 | Introduction to Crop Science | 3 |
| CSUS | 200 | Introduction to Sustainability | 3 |
| CSUS | 343 | Community Food and Agricultural Systems | 3 |
| TE | 409 | Crafting Teaching Practices in the Secondary |  |
|  |  | Teaching Minor | 1 |
| TE | 503 | Internship in Teaching Diverse Learners in |  |
|  |  | Additional Endorsement Areas | 1 |

* + 1. One of the following courses (3 credits):

AFRE 100 Decision-making in the Agri-Food System 3

AFRE 130 Farm Management I 3

* + 1. One of the following courses (2 or 3 credits): 4.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CSS | 143 | Introduction to Soil Science | | 2 |
| CSS | 210 | Fundamentals of Soil Science | | 3 |
| One of the following groups (3 credits): | | | | |
| a. | HRT | 242 | Passive Solar Greenhouses for Protected |  |
|  |  |  | Cultivation | 1 |
|  | HRT | 243 | Organic Transplant Production | 1 |
|  | HRT | 253 | Compost Production and Use | 1 |
| b. | HRT | 203 | Introduction to Horticulture | 3 |
| One of the following groups (6 credits): | | | | |
| a. | CSUS | 860 | Youth Leadership: Theory and Practice | 3 |
|  | CSUS | 861 | Educational Theory and Application of |  |
|  |  |  | Experiential Learning in AFNR | 3 |
| b. | CSUS | 222A | Seminar in Instructional Theory I – |  |
|  |  |  | Agriculture, Food and Natural |  |
|  |  |  | Resources Education | 1 |
|  | CSUS | 222B | Seminar in Instructional Theory II – |  |
|  |  |  | Agriculture, Food and Natural |  |
|  |  |  | Resources Education | 1 |
|  | CSUS | 222C | Seminar in Instructional Theory III – |  |
|  |  |  | Agriculture, Food and Natural |  |
|  |  |  | Resources Education | 1 |
|  | CSUS | 223A | Seminar in Leadership Theory I – |  |
|  |  |  | Agriculture, Food and Natural |  |
|  |  |  | Resources Education | 1 |
|  | CSUS | 223B | Seminar in Leadership Theory II – |  |
|  |  |  | Agriculture, Food and Natural |  |
|  |  |  | Resources Education | 1 |

5.

CSUS 223C Seminar in Leadership Theory III –

Agriculture, Food and Natural

Resources Education 1

### 28 or 29

Effective Summer 2022.

1. Change the requirements for **Bachelor of Science** degree in **Environmental Studies and Sustainability**

in the Department of Community Sustainability.

* 1. Under the heading **Requirements for the Bachelor of Science Degree in Environmental Studies and Sustainability** replace the item 3. with the following:

The following requirements for the major (64 to 66 credits):

a. All of the following Science Foundations courses (15 credits):

|  |  |  |  |
| --- | --- | --- | --- |
| BS | 161 | Cell and Molecular Biology | 3 |
| BS | 162 | Organismal and Population Biology | 3 |
| BS | 172 | Organismal and Population Biology Laboratory | 2 |
| CEM | 141 | General Chemistry | 4 |
| IBIO | 355 | Ecology | 3 |
| One of the following Applied Earth Sciences courses (3 or 4 credits): | | | |
| CSS | 210 | Fundamentals of Soil Science | 3 |
| GEO | 206 | Physical Geography | 3 |
| GLG | 201 | The Dynamic Earth | 4 |
| All of the following Community Sustainability Core courses (16 credits): | | | |
| CSUS | 200 | Introduction to Sustainability | 3 |
| CSUS | 221 | Seminar in Environmental and Sustainability Careers | 1 |
| CSUS | 300 | Theoretical Foundations of Sustainability | 3 |
| CSUS | 301 | Community Engagement for Sustainability (W) | 3 |
| CSUS | 310 | History of Environmental Thought and Sustainability | 3 |
| CSUS | 400 | Topics in Environmental Justice | 3 |

b.

c.

1. One of the following Intermediate Energy, Water, Land courses (3 credits):

CSUS 259 Sustainable Energy and Society 3

CSUS 320 Environmental Planning and Management 3

CSUS 354 Water Resources Management 3

1. One of the following Advanced Energy, Water, Land courses (3 credits):

CSUS 426 Conservation Planning and Adaptive Management 3

CSUS 453 Watershed Planning and Management 3

CSUS 459 Clean Energy System Policy 3

1. Two of the following Community Sustainability Intermediate Electives (6 credits):

|  |  |  |  |
| --- | --- | --- | --- |
| CSUS | 215 | International Development and Sustainability | 3 |
| CSUS | 265 | Exploring Environmental and Sustainability Issues |  |
|  |  | and Policy Using Film | 3 |
| CSUS | 273 | Introduction to Travel and Tourism | 3 |
| CSUS | 276 | Sustaining our National Parks and Recreation Lands | 3 |
| GEO | 221 | Introduction to Geographic Information | 3 |
| Two of the following Community Sustainability Advanced Electives (6 or 7 credits): | | | |
| CSUS | 343 | Community Food and Agricultural Systems | 3 |
| CSUS | 431 | Interpretation and Visitor Information Systems | 3 |
| CSUS | 445 | Community-Based Environmental and Sustainability |  |
|  |  | Education | 3 |
| CSUS | 473 | Social Entrepreneurship for Community Sustainability | 3 |
| CSUS | 476 | Natural Resource Recreation Management | 4 |
| Two of the following Administration and Leadership courses (6 credits): | | | |
| CSUS | 322 | Leadership for Community Sustainability | 3 |
| CSUS | 429 | Program Evaluation for Community Sustainability | 3 |
| CSUS | 430 | Non-Profit Organizational Management for |  |
|  |  | Community Sustainability | 3 |
| CSUS | 433 | Grant Writing and Fund Development | 3 |

g.

h.

1. One of the following Policy and Law courses: (3 credits)

CSUS 464 Environmental and Natural Resource Policy in Michigan 3

CSUS 465 Environmental and Natural Resource Law 3

1. A minimum of 3 credits in one of the following courses:

CSUS 418 Community Sustainability Study Abroad 3 to 6 CSUS 419 International Studies in Community Sustainability 3 to 12 CSUS 493 Professional Internship in Community Sustainability 3 to 6 Students may substitute another appropriate course with approval of the department.

Effective Fall 2022.

1. Change the requirements for the **Bachelor of Science** degree in **Forestry** in the Department of Forestry.
   1. Under the heading **Requirements for the Bachelor of Science Degree in Forestry** make the following changes:
2. Replace paragraph two with the following:

The University’s Tier II writing requirement for the Forestry major is met by completing Forestry 330, 340L, 406L, 414, and 462. Those courses are referenced in item 3. a. below.

1. In item 3. a. change the total credits from ‘64’ to ‘61’.
2. In item 3. a. delete the following course:

FOR 405 Forest Ecosystem Services 3

1. In item 3. d. delete the following course:

FW 443 Restoration Ecology 3

Add the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| FW | 417 | Wetland Ecology and Management | 3 |
| PLB | 443 | Restoration Ecology | 3 |

1. In item 3. e. delete the following course:

WRA 341 Nature and Environmental Writing 3

Add the following course:

CSUS 433 Grant Writing and Fund Development 3

Effective Fall 2022.

1. Change the requirements for the **Minor** in **Forestry** in the Department of Forestry.
   1. Under the heading **Requirements for the Minor in Forestry** make the following changes:
2. In item 3., delete the following course:

FOR 405 Forest Ecosystem Services 3

1. In item 4., delete the following courses:

FOR 404 Forest Ecology 3

FOR 404L Forest Ecology Laboratory 1

FOR 412 Wildland Fire 2

Add the following courses:

FOR 340 Forest Ecology 3

|  |  |  |  |
| --- | --- | --- | --- |
| FOR | 340L | Forest Ecology Laboratory | 1 |
| FOR | 413 | Wildland Fire Ecology and Management | 3 |

Effective Fall 2022.

1. Change the requirements for the **Minor** in **Urban and Community Forestry** in the Department of Forestry.
   1. Under the heading **Requirements for the Minor in Urban and Community Forestry** make the following changes:
2. In item 2., delete the following course:

FOR 405 Forest Ecosystem Services 3

1. In item 4., delete the following course:

FOR 404 Forest Ecology 3

Add the following course:

FOR 340 Forest Ecology 3

Effective Summer 2022.

## ELI BROAD COLLEGE BUSINESS

1. Change the requirements for the **Minor** in **Retail Management** in the Department of Management.
   1. Under the heading **Requirements for the Minor in Retail Management** make the following changes:
      1. In item 3., delete the following course:

MKT 351 Retail Management 3

* + 1. In item 4., delete the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| FIM | 460 | Retail Information Systems | 3 |
| MGT | 416 | Labor Management Relations | 3 |
| MKT | 355 | Entrepreneurship: Strategic Marketing Planning |  |
|  |  | and Launch | 3 |
| MKT | 439 | Strategic Management for Food and Agribusiness |  |
|  |  | Firms (W) | 3 |

Add the following courses:

|  |  |  |
| --- | --- | --- |
| AFRE 340  AFRE 445 | Food Marketing Research and Analytics  Strategic Management for Food and Agribusiness | 3 |
|  | Firms (W) | 3 |

Effective Spring 2022.

## COLLEGE OF COMMUNICATION ARTS AND SCIENCES

1. Change the requirements for the **Master of Arts** degree in **Health and Risk Communication** in the College of Communication Arts and Sciences. The University Committee on Graduate Studies (UCGS) approved this request at its November 15, 2021 meeting.
   1. Under the heading **Admission** delete item 4. and renumber items 5. and 6. respectively:

4. the Graduate Record Examination General Test scores.

* 1. Under the heading **Requirements for the Master of Arts Degree in Health and Risk Communication** in item 3., delete the following course:

ADV 860 Media Relations 3

Add the following course:

ADV 845 Advertising and Public Relations for Health, Science, and

the Environment 3

Effective Summer 2022.

1. Change the requirements for the **Graduate Specialization in Nonprofit Fundraising** in the Department of Communication. The University Committee on Graduate Studies (UCGS) approved this request at its November 15, 2021 meeting.
   1. Under the heading **Requirements for the Graduate Specialization in Nonprofit Fundraising**, in item 2., delete the following course:

ADV 823 Consumer Behavior Theories 3

Add the following course:

ADV 800 Advertising and Public Relations Theory 3

Effective Summer 2022.

1. Delete the curriculum and degree requirements for the **Disciplinary Teaching Minor** in **Journalism**, available for secondary certification, in the School of Journalism. The University Committee on Undergraduate Education (UCUE) provided consultative commentary to the Provost after considering this request. The Provost made the determination after considering the consultative commentary from the University Committee on Undergraduate Education to discontinue the program.

No new students are to be admitted to the program effective Fall 2021. No students are to be readmitted to the program effective Fall 2021. Effective Fall 2021, coding for the program will be discontinued and the program will no longer be available in the School of Journalism. Students who have not met the requirements for the Disciplinary Teaching Minor in Journalism through the School of Journalism prior to Fall 2021 will have to change their minor.

## COLLEGE OF ENGINEERING

1. Change the requirements in the **Master of Science** degree in **Computer Science** in the Department of Computer Science and Engineering. The University Committee on Graduate Studies (UCGS) approved this request at its November 15, 2021 meeting.
   1. Under the heading **Requirements for the Master of Science Degree in Computer Science** make the following changes:
      1. Under the heading **Theory and Algorithms** add the following course:

CSE 814 Formal Methods in Software Development 3

(3) Under the heading **Data Analysis and Applications** add the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| CSE | 840 | Computational Foundations in Artificial Intelligence | 3 |
| CSE | 849 | Deep Learning | 3 |

Effective Fall 2022.

1. Change the requirements in the **Doctor of Philosophy** degree in **Computer Science** in the Department of Computer Science and Engineering. The University Committee on Graduate Studies (UCGS) approved this request at its November 15, 2021 meeting.
   1. Under the heading **Requirements for the Doctor of Philosophy Degree in Computer Science** make the following changes:
      1. Replace item 1. with the following:

Students must complete a minimum of 30 credits beyond the research requirements in CSE 999. Students must maintain a cumulative grade-point average of at least 3.00 in all courses counted towards the 30 credits. The student’s guidance committee reserves the right to require additional course work beyond the minimum. Students should contact the graduate director for approval of any courses outside the Department of Computer Science and Engineering.

* + 1. In item 3. under the heading **Theory and Algorithms** add the following course: CSE 814 Formal Methods in Software Development 3
    2. In item 3. under the heading **Data Analysis and Applications** add the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| CSE | 840 | Computational Foundations in Artificial Intelligence | 3 |
| CSE | 849 | Deep Learning | 3 |

Effective Fall 2022.

## JAMES MADISON COLLEGE

1. Change the requirements for the **Bachelor of Arts** degree in **James Madison College [Social Relations and Policy]**. The Teacher Education Council (TEC) approved this request at its November 8, 2021 meeting.
   1. Under the heading **Requirements for the Bachelor of Arts Degree in James Madison College**

make the following changes:

* + 1. Under the heading ***Social Relations and Policy*** make the following change:
       1. In item 1. c. add the following course:

MC 338 Environmental Justice and Global Change 4

Effective Summer 2022.

## COLLEGE OF NATURAL SCIENCE

1. Change the requirements for the **Bachelor of Science** degree in **Biochemistry and Molecular Biology** in the Department of Biochemistry and Molecular Biology.
   1. Under the heading **Requirements for the Bachelor of Science Degree in Biochemistry and Molecular Biology** make the following changes:
      1. In item 3. a. change the total credits from ’61 to 69’ to ’58 to 64’.
      2. In item 3. a. (1) change the total credits from ‘11’ to ‘8’ and delete the following course: CEM 262 Quantitative Analysis 3
      3. Change item 3. a. (4) to the following:

One of the following groups of courses (2 credits):

* + - 1. CEM 161 Chemistry Laboratory I 1

CEM 162 Chemistry Laboratory II 1

* + - 1. LB 171L Introductory Chemistry Laboratory I 1

LB 172L Principles of Chemistry II - Reactivity

Laboratory 1

* + - 1. CEM 185H Honors Chemistry Laboratory I 2
    1. In item 3. a. (5) (a) add the following course:

LB 271 Organic Chemistry 3

* + 1. Change item 3. a. (8) (b) to the following and reletter (b), (c), and (d) respectively: PHY 221 Studio Physics for Life Sciences I 4

PHY 222 Studio Physics for Life Sciences II 4

* + 1. In item 3. b. change the total credits from ‘13’ to ‘18’ and delete the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| BMB | 470 | Advanced Molecular Biology Laboratory | 3 |
| BMB | 471 | Advanced Biochemistry Laboratory | 3 |

Add the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| BMB | 370 | Introductory Biochemistry Laboratory | 3 |
| BMB | 470 | Advanced Molecular Biology Laboratory | 4 |
| BMB | 471 | Advanced Biochemistry Laboratory | 4 |

Effective Summer 2022.

1. Change the requirements for the **Bachelor of Science** degree in **Biochemistry and Molecular Biology/Biotechnology** in the Department of Biochemistry and Molecular Biology.
   1. Under the heading **Requirements for the Bachelor of Science Degree in Biochemistry and Molecular Biology/Biotechnology** make the following changes:
      1. In item 3. a. change the total credits from ’66 to 73’ to ’63 to 71’.
      2. In item 3. a. (1) change the total credits from ‘11’ to ‘8’ and delete the following course: CEM 262 Quantitative Analysis 3
      3. Change item 3. a. (4) to the following:

One of the following groups of courses (2 credits):

* + - 1. CEM 161 Chemistry Laboratory I 1

CEM 162 Chemistry Laboratory II 1

* + - 1. LB 171L Introductory Chemistry Laboratory I 1

LB 172L Principles of Chemistry II - Reactivity

Laboratory 1

* + - 1. CEM 185H Honors Chemistry Laboratory I 2
    1. In item 3. a. (5) (a) add the following course:

LB 271 Organic Chemistry 3

* + 1. Change item 3. a. (8) (b) to the following and reletter item (b), (c), and (d) respectively:

|  |  |  |  |
| --- | --- | --- | --- |
| PHY | 221 | Studio Physics for Life Sciences I | 4 |
| PHY | 222 | Studio Physics for Life Sciences II | 4 |

* + 1. In item 3. a. (9) change the total credits from ‘3’ to ‘3 or 4’ and change the credits for BMB 470 from ‘3’ to ‘4’.
    2. In item 3. b. change the total credits from ‘10’ to ‘14’ and delete the following course: BMB 471 Advanced Biochemistry Laboratory 3

Add the following courses:

|  |  |  |
| --- | --- | --- |
| BMB 370 | Introductory Biochemistry Laboratory | 3 |
| BMB 471 | Advanced Biochemistry Laboratory | 4 |

Effective Summer 2022.

1. Change the requirements for the **Graduate Certificate in Neuroscience and the Law** in the Program in Neuroscience. The University Committee on Graduate Studies (UCGS) approved this request at its November 15, 2021 meeting.
   1. Under the heading **Requirements for the Graduate Certificate in Neuroscience and the Law**

replace the entire entry with the following:

Students must complete a minimum of 12 credits from the following courses:

1. Both of the following courses (3 credits):

|  |  |  |  |
| --- | --- | --- | --- |
| NEU | 840 | Introduction to Brain and Behavioral Disorders | 2 |
| NEU | 892 | Special Topics in Neuroscience and the Law | 1 |

1. Complete 9 credits from the following courses (9 credits):

|  |  |  |  |
| --- | --- | --- | --- |
| NEU | 842 | Neuroethics | 3 |
| NEU | 843 | Methods for Assessing the Nervous System | 3 |
| NEU | 844 | The Science and Ethics of Brain Interventions | 3 |
| NEU | 845 | Neuroscience of Drug Use and Human Disorders | 3 |

Effective Summer 2022.

1. Establish a **Master of Science** degree in **Accelerator Science and Engineering** in the Department of Physics and Astronomy. The University Committee on Graduate Studies (UCGS) recommended approval of this request at its September 20, 2021 meeting.

### Background Information:

Recent Department of Energy (DOE) and National Science Foundation (NSF) studies detailed issues with producing a sufficient number of highly trained Accelerator Science and

Engineering (AS&E) specialists to meet needs in both DOE laboratory facilities, discovery science, and technology/industry. Fulfilling these needs is critical to maintaining U.S. leadership in accelerator technology and enhancing economic growth. In 2017 the DOE issued a Funding Opportunity Announcement for Traineeship in AS&E. MSU’s proposal was the sole recipient of a DOE grant to address critical workforce needs in AS&E. Historically, MSU has produced a highly technical workforce in AS&E due to the presence of the National Superconducting Cyclotron Laboratory (NSCL). For decades, many graduate students have been trained at the NSCL under NSF-sponsored cooperative agreements and other federal funding. Currently MSU offers master’s and doctoral degrees in physics and in engineering. MSU now has the opportunity to offer an exciting training opportunity in accelerator science and engineering. The AS&E Traineeship (ASET) program at MSU is supported by the DOE and leverages the unique campus-based equipment, systems, and experts at the Facility for Rare Isotope Beams (FRIB) and NSCL. It also makes use of the many MSU faculty involved with the ASET program across several MSU academic programs and couples them with resources at U.S. DOE national laboratories. Partnering academic programs at MSU include the Departments of Physics and Astronomy, and Chemistry in the College of Natural Science in addition to the Department of Electrical and Computer Engineering in the College of Engineering. MSU has established a novel AS&E graduate student program to address all the major need areas stressed in the recent DOE and NSF studies: (1) Physics and engineering of large accelerators; (2) Superconducting RF (SRF) accelerator physics and engineering; (3) RF power engineering; (4) Large-scale cryogenic systems.

Students completing the curriculum will be certified, well trained, and ready for productive careers in AS&E where there are critical workforce needs nationally. The AS&E master’s program leverages the unique campus-based equipment, systems, and experts at the Facility for Rare Isotope Beams and NSCL. The department currently administers a Graduate Certificate in Accelerator Science and Engineering.

With the recent development of FRIB at MSU, the opportunities for graduate student training in AS&E at MSU have multiplied. Presently, MSU is building FRIB, a new ~$1B national-user facility for nuclear science funded by the DOE, MSU, and the state of Michigan. FRIB provides numerous training opportunities in the areas one through four listed above in a large facility. The large increase in scale constituted by FRIB (~ 5x larger) relative to the NSCL results in national-lab-scale facilities that can be exploited to do much more in AS&E training at MSU relative to historic levels to help address critical needs in the field. FRIB’s location on campus provides unique opportunities for AS&E student training at a world-class accelerator facility while the students are enrolled in Physics and Engineering courses.

### Academic Programs Catalog Text:

The Master of Science degree in Accelerator Science and Engineering provides graduate students the opportunity to further their understanding of accelerator science and technology. Graduates will be certified, well trained, and ready for productive careers in Accelerator Science and Engineering. Research is supported by the Accelerator Science and Engineering Traineeship (ASET) Program. Students will gain a broad understanding of physics and engineering of large accelerators; superconducting radio frequency accelerator physics and engineering; radio frequency power engineering; and large-scale cryogenic systems, and their role in accelerator science and

engineering. Upon completion of the program, students are able to contribute to the research and development of accelerator systems and associated technologies and support operations of accelerator systems, primarily, but not limited to accelerator systems at National Laboratories and industries.

In addition to meeting the requirements of the university and of the College of Natural Science, students must meet the requirements specified below.

### Admission

For admission to the master's degree program in accelerator science and engineering on regular status, the student must have:

1. Completed mathematics and physics courses equivalent to those that are required for an undergraduate major in physics.
2. A satisfactory grade–point average, normally at least 3.00, in the courses referenced in item 1. above.
3. General GRE and Physics GRE examinations are required for admission to the program. Scores should be sent electronically, directly to Michigan State University.
4. For international students, except those with a 4-year degree from a U.S. institution, TOEFL examination scores must be submitted with a total average score of 100 or higher on the iBT.

Students who do not meet the requirements for admission to the program on regular status may be admitted on a provisional basis to remove deficiencies. Collateral course work will not count towards the requirements for the degree.

### Requirements for the Master of Science Degree in Accelerator Science and Engineering

The student must complete a total of 30 credits for the degree with a grade-point average of 3.00 under Plan A (with thesis). A minimum of 16 credits must be at the 800-level or above.

CREDITS

#### *Requirements for Plan A:*

1. The following course (3 credits):

PHY 862 Accelerator Systems 3

1. At least two courses from the following or any other 800 or 900-level accelerator science-focused courses as approved by the Physics and Astronomy Graduate Program Director (6 credits):

|  |  |  |  |
| --- | --- | --- | --- |
| ECE | 837 | Computational Methods in Electromagnetics | 3 |
| ECE | 850 | Electrodynamics of Plasmas | 3 |
| ECE | 989 | Advanced Topics in Plasmas | 3 |
| PHY | 861 | Beam Physics | 3 |
| PHY | 864 | Accelerator Technology | 3 |
| PHY | 905 | Special Problems | 3 |
| PHY | 961 | Nonlinear Beam Dynamics | 3 |
| PHY | 962 | Particle Accelerators | 3 |
| PHY | 963 | U.S. Particle Accelerator School | 3 |
| PHY | 964 | Seminar in Beam Physics Research | 3 |

Additional courses may be used to fulfill this requirement if approved by the Director of Graduate Studies. Up to 14 credits of undergraduate senior-level courses that have not been used towards any other degree may be used to fulfill this requirement with the exception of PHY 405 and PHY 490.

#### *Additional Requirements for Plan A*

1. Complete 5 to 10 credits of PHY 899 Master’s Thesis Research.
2. Pass a final oral examination in defense of the thesis.

Effective Summer 2022.

1. Change the name of the **Master of Science** degree in **Physiology** to **Molecular, Cellular, and Integrative Physiology** in the Department of Physiology in the Colleges of Human Medicine, Natural Science, Osteopathic Medicine, and Veterinary Medicine. The College of Natural Science is the primary administrative unit. The University Committee on Graduate Studies (UCGS) approved this request at its November 15, 2021 meeting.

Students admitted to the major prior to Summer 2022 will be awarded a Master of Science Degree in Physiology.

Students admitted to the major Summer 2022 and forward will be awarded a Master of Science Degree in Molecular, Cellular, and Integrative Physiology.

Effective Summer 2022.

## COLLEGE OF SOCIAL SCIENCE

1. Change the requirements for the **Minor** in **Anthropology** in the Department of Anthropology.
   1. Under the heading **Requirements for the Minor in Anthropology** replace the entire entry with the following:

Complete a minimum of 18 credits from the following: 1.

|  |  |  |  |
| --- | --- | --- | --- |
| All of the following courses (9 credits): | | | |
| ANP | 201 | Introduction to Cultural Anthropology | 3 |
| ANP | 203 | Introduction to Archaeology | 3 |
| ANP | 206 | Introduction to Physical Anthropology | 3 |
| One of the following area courses (3 credits): | | | |
| ANP | 410 | Anthropology of Latin America | 3 |
| ANP | 411 | North American Indian Ethnography | 3 |
| ANP | 415 | China: Culture and Society | 3 |
| ANP | 417 | Introduction to Islam in Africa | 3 |
| ANP | 419 | Anthropology of the Middle East | 3 |
| ANP | 432 | American Indian Women | 3 |
| ANP | 433 | Contemporary American Indian Communities | 3 |
| ANP | 437 | Asian Emigrant Communities: A Global Perspective | 3 |
| ANP | 452 | North American Archaeology | 3 |
| ANP | 455 | Archaeology of Ancient Egypt | 3 |
| Two of the following topical/analytical/methods courses (6 to 8 credits): | | | |
| ANP | 310 | Archaeology of Human Migrations | 3 |
| ANP | 320 | Social and Cultural Theory | 3 |
| ANP | 321 | Anthropology of Social Movements | 3 |
| ANP | 325 | Anthropology of the Environment and Development | 3 |
| ANP | 330 | Race, Ethnicity, and Nation: Anthropological |  |
|  |  | Approaches to Collective Identity | 3 |
| ANP | 362 | Archaeology of Foragers to Farmers | 3 |
| ANP | 363 | Rise of Civilization | 3 |
| ANP | 364 | Fake Archaeology: Pseudoscience and the Past | 3 |
| ANP | 370 | Culture, Health, and Illness | 3 |
| ANP | 412 | Method and Practice in Digital Heritage | 3 |
| ANP | 420 | Language and Culture | 3 |
| ANP | 422 | Religion and Culture | 3 |
| ANP | 425 | Issues in Medical Anthropology | 3 |
| ANP | 426 | Urban Anthropology | 3 |
| ANP | 429 | Ethnographic Field Methods | 4 |
| ANP | 436 | Globalization and Justice: Issues in Political |  |
|  |  | and Legal Anthropology | 3 |

2.

3.

|  |  |  |  |
| --- | --- | --- | --- |
| ANP | 439 | Human Rights: Anthropological Perspectives | 3 |
| ANP | 440 | Hominid Fossils | 3 |
| ANP | 441 | Osteology and Forensic Anthropology | 4 |
| ANP | 443 | Human Adaptability | 3 |
| ANP | 461 | Method and Theory in Historical Archaeology | 3 |
| ANP | 463 | Laboratory Methods in Archaeology | 3 |
| ANP | 486 | Environmental Archaeology | 3 |

Effective Summer 2022.

1. Delete the curriculum and degree requirements for the **Master of Arts** degree in **Professional Applications in Anthropology** in the Department of Anthropology. The University Committee on Graduate Studies (UCGS) provided consultative commentary to the Provost after considering this request. The Provost made the determination to discontinue the program after considering the consultative commentary from the University Committee on Graduate Studies.

No new students are to be admitted to the program effective Fall 2020. No students are to be readmitted to the program effective Fall 2020. Effective Fall 2021, coding for the program will be discontinued and the program will no longer be available in the Department of Anthropology.

Students who have not met the requirements for the Master of Arts degree in Professional Applications in Anthropology through the Department of Anthropology prior to Fall 2021 will have to change their major.

1. Change the requirements for the **Bachelor of Arts** degree in **Economics** in the Department of Economics.
   1. Under the heading **Requirements for the Bachelor of Arts Degree in Economics** make the following changes:
      1. In item 1., paragraph three, delete Economics 406 and 412 from the Tier II writing requirement.
      2. In item 3. b. delete the following courses:

EC 306 Comparative Economics Systems 3

EC 406 Economic Analysis of Russia and the

Commonwealth of Independent

States (W) 3

EC 412 Economic Analysis of Latin America (W) 3

* + 1. In item 3. c. delete the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| EC | 406 | Economic Analysis of Russia and the  Commonwealth of Independent |  |
|  |  | States (W) | 3 |
| EC | 412 | Economic Analysis of Latin America (W) | 3 |

* + 1. In item 3. f. delete the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| STT | 351 | Probability and Statistics for Engineering | 3 |
| STT | 430 | Introduction to Probability and Statistics | 3 |
| STT | 442 | Probability and Statistics II: Statistics | 3 |

* + 1. Delete the optional cognate in business.

Effective Summer 2022.

1. Change the requirements for the **Bachelor of Science** degree in **Economics** in the Department of Economics.
   1. Under the heading **Requirements for the Bachelor of Science Degree in Economics** make the following changes:
      1. In item 1., paragraph three, delete Economics 406 and 412 from the Tier II writing requirement.
      2. In item 3. b. delete the following courses:

EC 306 Comparative Economics Systems 3

EC 406 Economic Analysis of Russia and the

Commonwealth of Independent

States (W) 3

EC 412 Economic Analysis of Latin America (W) 3

* + 1. In item 3. c. delete the following courses:

|  |  |  |  |
| --- | --- | --- | --- |
| EC | 406 | Economic Analysis of Russia and the  Commonwealth of Independent |  |
|  |  | States (W) | 3 |
| EC | 412 | Economic Analysis of Latin America (W) | 3 |

* + 1. In item 3. i. add the following course:

STT 380 Probability and Statistics for Data Science 4

* + 1. Delete the optional cognate in business.

Effective Summer 2022.

1. Establish a **Graduate Certificate** in **Animal Studies: Social Science and Humanities Perspectives** in the Department of Sociology. The University Committee on Graduate Studies (UCGS) approved this request at its September 13, 2021 meeting.

### Background Information:

The proposed Graduate Certificate in Animal Studies: Social Science and Humanities Perspectives will address one of the most challenging questions of our time: how can humans and other animals coexist in altruistic ways so that all beings thrive within our global ecosystem? The “animal question” is increasingly vital within law, public policy, ethics, and health. The growth in the critical evaluation of human-animal relationships is due to the widespread recognition of: (1) the commodification of animals in a wide variety of human contexts, such as the use of animals as food, labor, and objects of spectacle; (2) the degradation of the natural world, a staggering loss of animal habitat, and species extinction; and (3)the increasing need to coexist with other animals in urban, rural, and natural contexts.

Animal studies, sometimes known as human-animal studies and anthrozoology, is the scholarly investigation of the relationships between humans (as individuals, within communities, and in societies) and non-human animals (as individuals, in groups, and as species). The term “animal studies” refers to the social science/humanities-focused complement to the traditional bio-scientific study of animal behavior in disciplines such as animal science, zoology, and veterinary medicine. Animal studies extends scholarly examination to the cultural conditions of the relationship between humans and other animals. “Animal Studies” is the programmatic name for the field used by a dozen scholarly programs at U.S. colleges and universities, numerous academic book series, and a major reference work The Oxford Handbook of Animal Studies.

Currently, there are 28 undergraduate major and minor programs in animal studies at universities and colleges in North America, including:

* Animal Studies Major at Eastern Kentucky University;
* Animal Studies Major at Eckerd College;
* Animal Studies Major and Minor at Southwestern University;
* Animal Studies Minor at Appalachian State University;
* Animal Studies Minor at Drury University;
* Animal Studies Minor and MA Degree at New York University;
* Animal Studies Minor at St. Joseph’s University;
* Animal Studies Cluster at Wesleyan University;
* Animal Studies Constellation at University of Wisconsin-Madison; and
* Animal Studies Project at Harvard University.

Many of these programs would be potential feeder schools for the proposed Graduate Certificate in Animal Studies: Social Sciences and Humanities Perspectives. There are also 30 graduate programs in animal studies in the U.S. (including MSU’s Graduate Specialization in Animal Studies: Social Sciences and Humanities Perspectives), as well as a substantial number of undergraduate, graduate, and professional programs in related fields such as animal-assisted therapy and animal law. Furthermore, many institutions that do not offer programs in animal studies nonetheless offer animal studies courses and courses on related topics including animal ethics and animal law.

However, unlike most of these programs, our proposal is for an online-only program that would not require enrollment in a degree program nor presence on campus and would attract a much broader audience. This online program replaces MSU’s Graduate Specialization in Animal Studies: Social Sciences and Humanities Perspectives, which is the only animal studies doctoral-level program in North America.

### Academic Programs Catalog Text:

The Graduate Certificate in Animal Studies: Social Science and Humanities Perspectives, which is administered by the Department of Sociology, is an online program available to any individual with a bachelor’s degree. The certificate addresses society’s changing needs in providing individuals with a basic understanding of human relationships with other animals, including domestic and companion animals, liminal animals, and wildlife. The certificate is valuable as a complementary learning opportunity for individuals with, or who are planning careers in animal-related fields, including animal-assisted therapy, marine ecosystems, conservation criminology, animal shelters, sanctuaries, refuges, rehabilitation centers, and zoo management and education.

### Requirements for the Graduate Certificate in Animal Studies: Social Science and Humanities Perspectives

CREDITS

Students must complete 9 credits from the following:

|  |  |  |  |
| --- | --- | --- | --- |
| SOC | 830 | Animals and Environmental Sustainability | 3 |
| SOC | 840 | Animals and Social Transformations | 3 |
| SOC | 850 | Special Topics in Animal Studies | 3 |

Effective Summer 2022.

# PART II - NEW COURSES

## DEPARTMENT OF COMMUNITY SUSTAINABILITY

CSUS 477 Nature-based Tourism

Spring of every year. 3(3-0) P: CSUS 273 or CSUS 276 R: Open to juniors or seniors or graduate students.

Nature-based tourism types and differentiations from other forms of tourism. Environmental, social/cultural, and managerial impacts. Examination of applied research in the nature-based tourism field.

Effective Spring 2023

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CSE 840 Computational Foundations in Artificial Intelligence

Fall of every year. 3(3-0) RB: MTH 314 and STT 441 or equivalent R: Open to graduate students in the Department of Computer Science and Engineering or approval of department.

Conduct research in machine learning, artificial intelligence, deep learning, data mining, and other related fields.

Effective Fall 2022

CSE 849 Deep Learning

Spring of every year. 3(3-0) RB: MTH 314 and STT 441 or equivalent

CSE 841 or 842 or 847 R: Open to graduate students in the Department of Computer Science and Engineering or approval of department.

Overview of both the foundational ideas and the recent advances in deep neural network algorithms and applications.

Effective Fall 2022

CSE 892 Exploration of Research in Computer Science and Engineering

On Demand. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Approval of department.

Exploring research in computer science under faculty supervision, including but not limited to attending research group meetings, assisting faculty with a specific research project, and/or reading research literature.

Request the use of the Pass-No Grade (P-N) system. Effective Fall 2022

## DEPARTMENT OF ENTOMOLOGY

ENT 804 Scientific Communication Fall of every year. 2(2-0)

Topics in scientific communication, the publication process, publication ethics and the development of scientific manuscript writing skills.

Effective Fall 2020

## DEPARTMENT OF FORESTRY

FOR 111 Field Explorations of Urban and Community Forestry

Summer of every year. 1 credit. R: Open to agricultural technology students.

Introduction to urban and community forestry, including networking, equipment operations, and tree identification. One week summer course.

Effective Summer 2022

FOR 112 Career Development in Urban and Community Forestry

Spring of every year. 1(1-0) P: FOR 111 R: Open to agricultural technology students.

Preparation for academic success and professional careers in urban and community forestry. Effective communication, problem solving, and time management.

Effective Fall 2022

FOR 113 Urban Tree Care Equipment and Worker Safety

Fall of every year. 2(0-4) R: Open to agricultural technology students and open to undergraduate students in the Forestry Major.

Equipment use, maintenance, and safety standards in the tree care industry. Effective Fall 2022

FOR 114 Introduction to Climbing and Aerial Tree Work

Spring of every year. 1(0-3) P: FOR 113 R: Open to agricultural technology students and open to undergraduate students in the Forestry Major.

Practices and techniques of tree climbing and aerial tree work. Effective Fall 2022

FOR 120 Survey of Urban and Community Forestry

Spring of every year. 2(2-0) R: Open to agricultural technology students.

Introduction to core concepts related to urban and community forests. Effective Fall 2022

FOR 125 Methods of Engagement in Urban and Community Forestry

Fall of every year. 2(2-0) P: FOR 120 or approval of department R: Open to agricultural technology students and open to undergraduate students in the Forestry Major.

Engaging with community members, stakeholders, and partners to share in decision making processes that benefit the urban community landscape.

Effective Fall 2022

FOR 225 Urban Forestry Information Technology

Spring of every year. 3(1-4) P: FOR 222 R: Open to agricultural technology students.

Urban and community forestry data acquisition, data management and spatial analysis through a series of hands-on projects.

Effective Fall 2022

FOR 235 Urban Tree Care Practicum

Fall of every year. 3(1-4) P: HRT 213 and FOR 113 and FOR 114 R: Open to agricultural technology students and open to undergraduate students in the Forestry Major.

Practice of skills associated with urban tree care work. Effective Fall 2022

FOR 240 Crew Leadership and Management in Arboriculture

Spring of every year. 2(1-3) P: FOR 235 RB: Completion of a majority of the IAT Urban Forest Management courses or established background with working in the urban and community forestry industry. R: Open to agricultural technology students and open to undergraduate students in the Forestry Major.

Aspects of crew leadership and communication in arboriculture. Effective Fall 2022

FOR 245 Capstone Experience in Urban and Community Forestry

Spring of every year. 2(1-3) P: FOR 125 and (FOR 225 or concurrently) and FOR 235 R: Open to agricultural technology students and open to undergraduate students in the Forestry Major.

Applications of urban forestry to improve green infrastructure for cities, towns and communities. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values and perceptions.

Effective Fall 2022

FOR 471 Consulting Forestry

Spring of every year. 3(3-0) P: FOR 419 or concurrently

Basics of running a consulting forestry business. Ethics, business establishment, marketing, and taxes. Field trip required.

Effective Spring 2022

## PROGRAM IN NEUROSCIENCE

NEU 845 Neuroscience of Drug Use and Human Disorders

Spring of every year. 3(3-0) RB: NEU 840 or concurrently

REINSTATEMENT Introduction to the neurochemical basis of human disorders and how drugs are used to treat these disorders.

Effective Spring 2022

## DEPARTMENT OF SOCIOLOGY

SOC 830 Animals and Environmental Sustainability

Fall of every year. Spring of every year. Summer of every year. 3(3-0)

Study of sustainable relationships among humans, animals, and the natural world. Effective Fall 2021

SOC 850 Special Topics in Animal Studies

Fall of every year. Spring of every year. Summer of every year. 3(3-0)

Special topics and emerging issues in animal studies, including animal subjectivity and agency and intersecting race-gender-animal forms of oppression.

Effective Fall 2021

## DEPARTMENT OF STATISTICS AND PROBABILITY

STT 810 Mathematical Statistics for Data Scientists

Fall of every year. Summer of every year. 3(3-0) RB: STT 442 R: Open to seniors in the Department of Statistics and Probability and not open to graduate students in the Department of Statistics and Probability.

Random variables. Probability distributions. Transformation of variables. Maximum likelihood estimation. Interval estimation. Hypothesis testing.

Effective Summer 2022

STT 811 Applied Statistical Modeling for Data Scientists

Spring of every year. Summer of every year. 3(3-0) RB: STT 442 R: Open to seniors in the Department of Statistics and Probability and not open to graduate students in the Department of Statistics and Probability.

Data Visualization. Linear regression. Analysis of variance. Logistic regression. Generalized linear models. Variable selection. Categorical data analysis. Models for design of experiments. Models for time series data.

Effective Summer 2022

STT 812 Statistical Learning and Data Analysis

Spring of every year. Summer of every year. 3(3-0) P: (STT 441 and STT 442) or (STT 810 and STT 811) or (STT 863 and STT 864) R: Open to seniors in the Department of Statistics and Probability and not open to graduate students in the Department of Statistics and Probability.

Low dimensional data visualization. Linear Regression. Binary Regression. Linear discriminant analysis. Probabilistic classification. Model selection via regularization. LASSO. Non-parametric smoothing. CART. MART. Support vector machine. Neural network. Clustering. Random forest.

Effective Summer 2022

# PART III – COURSE CHANGES

## SCHOOL OF CRIMINAL JUSTICE

CJ 220 Criminology

Fall of every year. Spring of every year. 3(3-0) ~~R~~: ~~Ope~~n ~~t~~o stude~~nt~~s ~~i~~n ~~th~~e P~~eac~~e a~~n~~d Justice Studies Minor or in the Sociology Major or in the Youth and Society Minor or in the Criminal Justice Major or in the Law, Justice, and Public Policy Minor or in the Conservation and Environmental Law Enforcement ~~Mino~~r ~~o~~r approval ~~o~~f school. R: Open to students in the Peace and Justice Studies Minor or in the Law, Justice, and Public Policy Minor or in the Youth and Society Minor or in the Criminal Justice Major or in the Conservation and Environmental Law Enforcement Minor or approval of school.

Introduction to the socio-legal foundation of crime. Crime typology and measurement procedures. Theory and public policy. Societal responses to crime and criminals.

~~Effectiv~~e Fa~~l~~l 2020 Effective Summer 2022

CJ 871 Advanced Crime Analysis

Spring of every year. 3(3-0) P: CJ 870 or approval of school

Advanced application of intelligence and crime analysis skills and techniques. ~~Effectiv~~e Fa~~l~~l 2021 Effective Summer 2022

CJ 896 Policy Analysis under Conditions of Change

Fall of every year. Spring of every year. 3(3-0) P: CJ 811 and (CJ 887 or concurrently) RB: At least 75% of MS course work complete R: Open to graduate students in the School of Criminal Justice

.

~~Method~~s ~~o~~f poli~~c~~y ~~analysi~~s in criminal justice ~~settings~~. ~~Polic~~y ~~analysi~~s ~~fo~~r the formulation, ado~~ption~~, a~~n~~d implementation ~~o~~f ~~changes~~. Capstone. Methods of policy analysis in criminal justice settings. Policy analysis for the formulation, adoption, and implementation of changes.

~~Effectiv~~e Fa~~l~~l 2019 Effective Spring 2022

CJ 897 Comprehensive Threat Assessment

Fall of every year. Spring of every year. Summer of every year. 3(3-0) P: CJ 837 R: Open to graduate students in the Law Enforcement Intelligence and Analysis Major.

~~Method~~s ~~o~~f conducti~~n~~g a comprehensive ~~threa~~t assessment ~~i~~n ~~crimina~~l just~~ic~~e settings. Comprehensive ~~threa~~t assess~~men~~t ~~fo~~r ~~th~~e formulation, adopt~~ion~~, ~~an~~d implementation of preven~~tio~~n and interventi~~o~~n pr~~actices~~. Capstone. Methods of conducting a comprehensive threat assessment in criminal justice settings. Comprehensive threat assessment for the formulation, adoption, and implementation of prevention and intervention practices.

~~Effectiv~~e Fa~~l~~l 2019 Effective Spring 2022

## DEPARTMENT OF ECONOMICS

EC 406 Economic Analysis of Russia and the Commonwealth of Independent States (W)

Spring of even years. 3(3-0) P: (EC 202 or EC 252H) and (EC 301 or EC 251H) and Completion of Tier I Writing Requirement

Analysis of structure and performance of planning, transition economy, and post-transition economy in Russia and the commonwealth of independent states (CIS) with focus on micro foundations of macroeconomic outcomes.

DELETE COURSE

Effective Spring 2022

EC 412 Economic Analysis of Latin America (W)

Fall of even years. 3(3-0) P: (EC 202 or EC 252H) and (EC 301 or EC 251H) and Completion of Tier I Writing Requirement

Population growth, agriculture, and urbanization. Dependence on primary exports and import protection. Inequality and populist-orthodox policy cycles. Hyper-inflation, international debt crises, and adjustments. United States policy interests and interventions.

DELETE COURSE

Effective Spring 2022

EC 420 Introduction to Econometric Methods

Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P~~: ~~(E~~C ~~20~~2 ~~o~~r ~~E~~C ~~252H~~) and ~~(E~~C ~~251~~H ~~o~~r ~~E~~C ~~301~~) a~~n~~d (MTH ~~12~~4 ~~o~~r MTH ~~13~~2 ~~o~~r MTH ~~152H~~) ~~an~~d (STT ~~31~~5 ~~o~~r STT ~~35~~1 ~~o~~r STT ~~42~~1 ~~o~~r STT 430 ~~o~~r STT 442) P: (EC 202 or EC 252H) and (EC 251H or EC 301) and (MTH 124 or MTH 132 or MTH 152H) and (STT 315 or STT 351 or STT 380 or STT 421 or STT 430 or STT 442)

Specification, estimation, and interpretation of econometric models. Evaluation of current quantitative work in economics.

~~Effectiv~~e Fa~~l~~l 2021 Effective Summer 2022

EC 491 Advanc~~e~~d Topi~~c~~s ~~i~~n Economics Topics in Economics

Fall of every year. Spring of every year. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. P: (EC 251H or EC 301) and (EC 252H or EC 302) and (MTH 124 or MTH 132 or MTH 152H) ~~R~~: Approv~~a~~l ~~o~~f department.

Advanc~~e~~d work ~~i~~n specializ~~e~~d ~~topic~~s ~~o~~f econom~~ics~~. Select work in specialized topics of economics.

~~Effectiv~~e Fa~~l~~l 2014 Effective Fall 2022

## DEPARTMENT OF FORESTRY

FOR 110 ~~Semina~~r ~~o~~n Contempor~~ar~~y ~~Issue~~s ~~i~~n Fo~~rest~~s ~~an~~d ~~th~~e Environment Contemporary Issues in Forests and the Environment

Fall of every year. 1(1-0)

Role of forests in environmental quality and human well-being. Request the use of the Pass-No Grade (P-N) system.

~~Effectiv~~e Fa~~l~~l 2013 Effective Fall 2022

FOR 335 Socioeconomics ~~o~~f Sustainable Bioproducts

Business Innovation Toward a Sustainable BioEconomy

Fall of every year. ~~Sprin~~g ~~o~~f ev~~er~~y year. 3(3-0) RB: FOR 212 R: Not open to freshmen.

Role of forest bioproducts in developing sustainable communities. Resource planning and availability for value added bioproducts. Bioproducts supply-chains analysis and principles of life cycle implementation.

~~Effectiv~~e Fa~~l~~l 2018 Effective Fall 2022

FOR 340 Forest Ecology

Fall of every year. 3(3-0) ~~P~~: ~~((CS~~S ~~210~~) a~~n~~d completi~~o~~n ~~o~~f Ti~~e~~r I ~~writin~~g requirem~~ent~~) and ~~(PL~~B 105 ~~o~~r ~~B~~S ~~16~~2 ~~o~~r LB 144) P: ((CSS 210 or GEO 206) and completion of Tier I writing requirement) and (PLB 105 or BS 162 or LB 144) RB: IBIO 355

Ecological interactions crucial to the sustainable management of forest ecosystems. Plant resources, species interactions, succession, biodiversity, productivity, nutrient and carbon cycling, ecosystem structure and function, exotic species, global environmental change. SA: FOR 404

~~Effectiv~~e Fa~~l~~l 2019 Effective Fall 2022

FOR 372 Ecological Monitoring and Data Analysis

Spring of every year. 3(2-2) Interdepartmental with Geography. ~~P~~: ~~((MT~~H 1~~2~~4 ~~o~~r ~~MT~~H 132) and completi~~o~~n ~~o~~f Ti~~e~~r I ~~writin~~g requirem~~ent~~) and (STT ~~20~~1 ~~o~~r STT ~~22~~4 ~~o~~r STT ~~23~~1 ~~o~~r STT 421) P: ((MTH 124 or MTH 132) and completion of Tier I writing requirement) and (STT 201 or STT 224 or STT 231 or STT 421 or GEO 363)

Design of ecological monitoring systems and analysis of resulting ecological data sets. Monitoring system design, model specification and implementation, and computational considerations from both a design- and model-based perspective. Hands-on introduction to statistical software.

SA: FOR 472

~~Effectiv~~e Spring 2020 Effective Summer 2022

FOR 405 Forest Ecosystem Services

Spring of every year. 3(3-0) P: ((MTH 124 or MTH 132) and completion of Tier I writing requirement) and EC 201 RB: FOR 202 and FOR 404 R: Not open to freshmen or sophomores.

Ecosystem services and their quantification and valuation. Sustainable management of forest ecosystem services. Global overview of non-timber forest products. Field trips required.

DELETE COURSE

Effective Spring 2022

FOR 406 Applied Forest Ecology: Silviculture

Fall of every year. 3(3-0) ~~P~~: ((F~~O~~R ~~40~~4 ~~o~~r co~~ncurrently~~) ~~o~~r (I~~BI~~O ~~35~~5 ~~o~~r conc~~urrently)~~) and completi~~o~~n ~~o~~f Ti~~e~~r I ~~writin~~g requirement P: ((FOR 340 or concurrently) or (IBIO 355 or concurrently)) and completion of Tier I writing requirement R: Not open to freshmen or sophomores.

Ecophysiology of tree growth and reproduction. Stand structure, composition and growth. Intermediate stand treatments. Natural and artificial reproduction. Silvicultural techniques. ~~Effectiv~~e Fa~~l~~l 2016 Effective Fall 2022

FOR 420 Forestry Field Studies

Summer of every year. Huron-Manistee National Forest, Huron-Manistee National Forest, Huron- Manistee National Forest 3 credits. ~~P~~: FOR ~~20~~4 a~~n~~d FOR ~~22~~2 a~~n~~d FOR ~~40~~4 a~~n~~d FOR ~~40~~6 and ~~CS~~S 210 P: FOR 204 and FOR 222 and FOR 340 and FOR 406 and CSS 210 R: Open to juniors or seniors in the College of Agriculture and Natural Resources.

Integration of tree biology, forest ecology, soil science, silviculture, forest mapping and inventory methods in a variety of forest ecosystems in Michigan. Quantitative and qualitative assessments of forests, defining silvicultural alternatives and executing a stand management plan. Field trips required.

~~Effectiv~~e Fa~~l~~l 2013 Effective Summer 2022

FOR 427 Biomass and Bioproducts Chemistry

~~Sprin~~g ~~o~~f ~~ever~~y year. Spring of even years. 3(2-2) P: CEM 141 or CEM 151 or LB 171 RB: FOR 212 R: Not open to freshmen.

Chemistry of wood, engineered composites and bioproducts. Chemical characterization of biopolymers from woody biomass and bioproducts. Analytical methods related to bioproducts chemistry.

~~Effectiv~~e Fa~~l~~l 2018 Effective Spring 2022

## DEPARTMENT OF GEOGRAPHY, ENVIRONMENT, AND SPATIAL SCIENCES

GEO 201 Introduction to Plant Geography

Fa~~l~~l ~~o~~f ~~eve~~n years. Spring of even years. 3(3-0) R: Not open to graduate students.

Geographic distribution and characteristics of plants throughout the world; relationships between biomes and aspects of the physical environment (climate, soils, landforms, disturbance); plant ecology; human impacts on vegetation; optional field trip on campus. ~~Effectiv~~e Fa~~l~~l 2017 Effective Spring 2024

## DEPARTMENT OF INTEGRATIVE BIOLOGY

FOR 870

IBIO 870 Spatial Ecology

Fall of every year. 3(2-2) Interdep~~artmenta~~l with Fisheries ~~an~~d Wildlife. Interdepartmental with Forestry and Fisheries and Wildlife RB: (ZOL 851 or concurrently) or Equivalent

Science of understanding and predicting ecological patterns in space. ~~Effectiv~~e Fa~~l~~l 2015 Effective Fall 2022

## DEPARTMENT OF LINGUISTICS, LANGUAGES AND CULTURES

LIN 463 Introduction to Cognitive Science

Fall of every year. 3(3-0) Interdep~~artmenta~~l ~~wit~~h Philosophy ~~an~~d Psychology. Interdepartmental with Communication Arts and Sciences and Philosophy and Psychology

Cognitive processing of information by animals, humans, and computers. Relevant issues in philosophy, linguistics, psychology, neurophysiology, and artificial intelligence.

~~Effectiv~~e Fa~~l~~l 2015 Effective Summer 2022

## PROGRAM IN NEUROSCIENCE

NEU 840 ~~Social~~, Cognitiv~~e~~, ~~an~~d ~~Affectiv~~e Neuroscience Introduction to the Brain and Behavioral Disorders

Fall of every year. 3(3-0) 2(2-0) Not open to students with credit in NEU 839 or NEU 841.

Introduction to nervous system structure and function aimed at students and professionals with limited biological science background.

~~Effectiv~~e Fa~~l~~l 2021 Effective Summer 2022

NEU 844 The Science and Ethics of Brain Interventions

Fall of every year. ~~Summe~~r ~~o~~f ~~ever~~y year. ~~2(2-0)~~ 3(3-0) ~~RB~~: ~~(NE~~U 840 ~~o~~r co~~ncurrently~~) ~~o~~r (N~~E~~U 841 ~~o~~r concurrently) RB: (NEU 841 or concurrently) or (NEU 840 or concurrently)

Introduction to cognitive enhancement to improve intellect and cognition, and legal and ethical implications of this.

~~Effectiv~~e ~~Summe~~r 2017 Effective Summer 2022

NEU 892 Special Topics in Neuroscience and the Law

Fa~~l~~l ~~o~~f ~~ever~~y year. Summer of every year. 1 ~~t~~o 3 credits. 1(1-0) A ~~studen~~t ~~ma~~y ~~ear~~n a ma~~ximu~~m ~~o~~f 4 ~~credit~~s ~~i~~n all enrollmen~~t~~s ~~fo~~r ~~thi~~s course. RB: NEU 840 or concurrently

Topics in which the field of neuroscience and the legal system intersect ~~Effectiv~~e Fa~~l~~l 2016 Effective Summer 2022

## SCHOOL OF PACKAGING

PKG 492 Senior Seminar

Spring of every year. 1(2-0) R: Open to seniors in the Packaging major.

Seminar on current packaging issues, business organization and operations, and accepted practices in a corporate environment.

DELETE COURSE

Effective Spring 2022

## DEPARTMENT OF SOCIOLOGY

SOC 840 Animals and Social Transformations

Fall of every year. Spring of every year. Summer of every year. 3(3-0)

Historical examination ~~o~~f ~~th~~e human-animal relationship~~s~~. Historical examination of human-animal relationships.

~~Effectiv~~e Spring 2007 Effective Fall 2020