PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Request to change the requirements for the **Bachelor of Science** degree in **Forestry** in the Department of Forestry.

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

      (1) 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.

      (2) In item 3. a. change the total credits from ‘64’ to ‘61’.

      (3) In item 3. a. delete the following course:

      FOR 405 Forest Ecosystem Services 3

      (4) 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

      (5) 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.

2. Request to change the requirements for the **Minor in Forestry** in the Department of Forestry.

   a. Under the heading **Requirements for the Minor in Forestry** make the following changes:

      (1) In item 3., delete the following course:

      FOR 405 Forest Ecosystem Services 3

      (2) 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.

3. Request to change the requirements for the Minor in Urban and Community Forestry in the Department of Forestry.

a. Under the heading Requirements for the Minor in Urban and Community Forestry make the following changes:

   (1) In item 2., delete the following course:

   FOR 405 Forest Ecosystem Services 3

   (2) In item 4., delete the following course:

   FOR 404 Forest Ecology 3

   Add the following course:

   FOR 340 Forest Ecology 3

Effective Summer 2022.

**COLLEGE OF ENGINEERING**

1. Request to 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) will consider this request at its November 15, 2021 meeting.

   a. 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.

2. Request to 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) will consider this request at its November 15, 2021 meeting.

   a. 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.

(2) In item 3. under the heading ‘Theory and Algorithms’ add the following course:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 814</td>
<td>Formal Methods in Software Development</td>
<td>3</td>
</tr>
</tbody>
</table>

(3) In item 3. under the heading ‘Data Analysis and Applications’ add the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 840</td>
<td>Computational Foundations in Artificial Intelligence</td>
<td>3</td>
</tr>
<tr>
<td>CSE 849</td>
<td>Deep Learning</td>
<td>3</td>
</tr>
</tbody>
</table>

Effective Fall 2022.

**COLLEGE OF NATURAL SCIENCE**

1. Request to change the requirements for the Bachelor of Science degree in Biochemistry and Molecular Biology in the Department of Biochemistry and Molecular Biology.

   a. 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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM 262</td>
<td>Quantitative Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

(3) Change item 3. a. (4) to the following:

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

(a) CEM 161 Chemistry Laboratory I 1
CEM 162 Chemistry Laboratory II 1
(b) LB 171L Introductory Chemistry Laboratory I 1
LB 172L Principles of Chemistry II - Reactivity Laboratory 1
(c) CEM 185H Honors Chemistry Laboratory I 2

(4) In item 3. a. (5) (a) add the following course:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB 271</td>
<td>Organic Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 221</td>
<td>Studio Physics for Life Sciences I</td>
<td>4</td>
</tr>
<tr>
<td>PHY 222</td>
<td>Studio Physics for Life Sciences II</td>
<td>4</td>
</tr>
</tbody>
</table>

(6) In item 3. b. change the total credits from ‘13’ to ‘18’ and delete the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMB 470</td>
<td>Advanced Molecular Biology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>BMB 471</td>
<td>Advanced Biochemistry Laboratory</td>
<td>3</td>
</tr>
</tbody>
</table>

Add the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMB 370</td>
<td>Introductory Biochemistry Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>BMB 470</td>
<td>Advanced Molecular Biology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BMB 471</td>
<td>Advanced Biochemistry Laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>

Effective Summer 2022.
2. Request to change the requirements for the **Bachelor of Science** degree in **Biochemistry and Molecular Biology/Biotechnology** in the Department of Biochemistry and Molecular Biology.

   a. 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):
   (a)  CEM 161  Chemistry Laboratory I  1
        CEM 162  Chemistry Laboratory II  1
   (b)  LB 171L  Introductory Chemistry Laboratory I  1
        LB 172L  Principles of Chemistry II - Reactivity Laboratory  1
   (c)  CEM 185H  Honors Chemistry Laboratory I  2

   (4) In item 3. a. (5) (a) add the following course:

   LB 271  Organic Chemistry  3

   (5) 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

   (6) 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'.

   (7) 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.
3. Request to change the requirements for the Graduate Certificate in Neuroscience and the Law in the Program in Neuroscience. The University Committee on Graduate Studies (UCGS) will consider this request at its November 15, 2021 meeting.

   a. 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
   2. 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.

4. Request to 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.

   a. 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.

b. **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.

**Requirements for Plan A:**

1. The following course (3 credits):
   - PHY 862 Accelerator Systems 3

2. 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.

5. Request to 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) will consider 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.
PART II - NEW COURSES AND CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

ENT 804 Scientific Communication  
Fall of every year. 2(2-0) R: Open to graduate students.  
NEW Topics in scientific communication, the publication process, publication ethics and the development of scientific manuscript writing skills.  
Effective Fall 2020

FOR 110 Seminar on Contemporary Issues in Forests and the 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.  
Effective Fall 2013 Effective Fall 2021

FOR 111 Field Explorations of Urban and Community Forestry  
Summer of every year. 1 credit. R: Open to agricultural technology students.  
NEW 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.  
NEW 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.  
NEW 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.  
NEW 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.  
NEW 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.  
NEW 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.  
NEW 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.
NEW Practice of skills associated with urban tree care work.
Effective Fall 2022

FOR 240  Crew Leadership & Management in Arboriculture
Spring of every year. 2(1-3) P: FOR 235 RB: It is recommended that you enroll in this course after completing a majority of the other IAT Urban Forest Management courses OR that you enroll in this course with an already 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.
NEW 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.
NEW 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 335  Socioeconomics of Sustainable Bioproducts
Business Innovation Toward a Sustainable BioEconomy
Fall of every year. Spring of every 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.
Effective Fall 2018 Effective Fall 2021

FOR 340  Forest Ecology
Fall of every year. 3(3-0) P: ((CSS 210) and completion of Tier I writing requirement) and (PLB 105 or BS 162 or 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
Effective Fall 2019 Effective Fall 2022

FOR 372  Ecological Monitoring and Data Analysis
Spring of every year. 3(2-2) Interdepartmental with Geography. 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) 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
Effective Spring 2020 Effective Spring 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 2021
FOR 406  Applied Forest Ecology: Silviculture
Fall of every year. 3(3-0) P: ((FOR 404 or concurrently) or (IBIO 355 or concurrently)) and completion of Tier I writing 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.
Effective Fall 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, Huron-Manistee National Forest 3 credits. P: FOR 204 and FOR 222 and FOR 404 and FOR 406 and CSS 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.
Effective Fall 2013 Effective Summer 2022

FOR 427  Biomass and Bioproducts Chemistry
Spring of every 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.
Effective Fall 2018 Effective Spring 2022

FOR 471  Consulting Forestry
Spring of every year. 3(3-0) P: FOR 419 or concurrently
NEW Basics of running a consulting forestry business. Ethics, business establishment, marketing, and taxes. Field trip required.
Effective Spring 2022

FOR 870  Spatial Ecology
Fall of every year. 3(2-2) Interdepartmental with Fisheries and Wildlife, Interdepartmental with Fisheries and Wildlife and Integrative Biology RB: (ZOL 851 or concurrently) or Equivalent RB: (IBIO 830 or concurrently) or Equivalent
Science of understanding and predicting ecological patterns in space.
Effective Fall 2015 Effective Fall 2021

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 Fall 2020

COLLEGE OF 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.
NEW This course will serve as an introductory course for graduate students interested to 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.
NEW Deep neural networks are a class of machine learning algorithms that are originally inspired by the brain, but have witnessed considerable success in real-world applications in artificial intelligence. These methods are at the core of production systems at companies like Google, Facebook, Amazon etc. for image processing, speech processing, and language understanding. This course will give an 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.
NEW Exploration of Research in Computer Science and Engineering
Request the use of the Pass-No Grade (P-N) system.
Effective Fall 2022

COLLEGE OF NATURAL SCIENCE

NEU 840  Social, Cognitive, and Affective 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.
Effective Fall 2021 Effective Spring 2022

NEU 844  The Science and Ethics of Brain Interventions
Fall of every year. Summer of every year. 2(2-0) 3(3-0) RB: (NEU 840 or concurrently) or (NEU 841 or concurrently) RB: (NEU 840 or concurrently) or (NEU 841 or concurrently)
Introduction to cognitive enhancement to improve intellect and cognition, and legal and ethical implications of this.
Effective Summer 2017 Effective Summer 2022

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

NEU 892  Special Topics in Neuroscience and the Law
Fall of every year. Summer of every year. 4 to 3 credits. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. RB: NEU 840 or concurrently
Topics in which the field of neuroscience and the legal system intersect
Effective Fall 2016 Effective Summer 2022

STT 810  Mathematical Statistics for Data Scientists
Fall of every year. Summer of every year. 3(3-0) RB: STT 442 R: Not open to freshmen or sophomores or juniors and not open to graduate students in the Department of Statistics and Probability and open to seniors. Approval of department.
NEW Random variables; Probability distributions; transformation of variables; maximum likelihood estimation; interval estimation; hypothesis testing
Effective Fall 2021
STT 811  Applied Statistical Modeling for Data Scientists
Spring of every year. Summer of every year. 3(3-0) RB: STT 442 R: Not open to freshmen or sophomores or juniors and not open to graduate students in the Department of Statistics and Probability and open to seniors in the Department of Statistics and Probability. Approval of department.
NEW  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 Spring 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: Not open to freshmen or sophomores or juniors and not open to graduate students in the Department of Statistics and Probability and open to seniors in the Department of Statistics and Probability.
NEW  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 Spring 2022