MICHIGAN STATE UNIVERSITY
University Committee on Curriculum

SUBCOMMITTEE A – AGENDA

Via Teams
March 26, 2026
1:30 p.m.

PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF ENGINEERING

1. Request to change the requirements in the **Bachelor of Science** degree in **Chemical Engineering** in the Department of Chemical Engineering and Materials Science.

The concentrations in the Bachelor of Science degree in Chemical Engineering are noted on the student's academic record when the requirements for the degree have been completed.

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

(1) In item 3. a., change the total credits from '54' to '57' and delete the following courses:

CEM	152	Principles of Chemistry	3
CEM	351	Organic Chemistry I	3
CEM	352	Organic Chemistry II	3

Add the following courses:

CEM	152	Principles of Chemistry	4
CEM	351	Organic Chemistry I	4
CEM	352	Organic Chemistry II	4

(2) Delete item 3. b. and reletter item 3. c., 3. d., and 3.e. respectively.

b. Under the heading **Concentrations in Chemical Engineering** make the following changes:

(1) Under the **Biochemical Engineering** concentration, replace the entire entry with the following:

To earn a Bachelor of Science degree in Chemical Engineering with a biochemical engineering concentration, students must complete requirements 1., 2., 3. a., and 3.c. above and the following:
Both of the following courses (6 credits):

CHE	481	Biochemical Engineering	3
MGI	301	Introductory Microbiology	3

One of the following tracks (8 to 10 credits):
Track 1 (9 or 10 credits):
The following course (4 credits):

BMB	401	Comprehensive Biochemistry	4

Two of the following courses (5 or 6 credits):

BMB	805	Protein Structure, Design, and Mechanism	3
BMB	829	Special Problems in Macromolecular Analysis and Synthesis	2
CHE	882	Advanced Biochemical Engineering	3
CHE	883	Multidisciplinary Bioprocessing Laboratory	3
MGI	409	Eukaryotic Cell Biology	3
MGI	421	Prokaryotic Cell Physiology	3
MGI	431	Microbial Genetics	3

Track 2 (8 or 9 credits):
Both of the following courses (6 credits):

BMB	461	Advanced Biochemistry I	3
BMB	462	Advanced Biochemistry II	3

One of the following courses (2 or 3 credits):

BMB	805	Protein Structure, Design, and Mechanism	3
BMB	829	Special Problems in Macromolecular Analysis and Synthesis	2
CHE	882	Advanced Biochemical Engineering	3
CHE	883	Multidisciplinary Bioprocessing Laboratory	3

MGI	409	Eukaryotic Cell Biology	3
MGI	421	Prokaryotic Cell Physiology	3
MGI	431	Microbial Genetics	3

(2) Under the **Bioenergy and Bioproducts** concentration make the following changes:

(a) Delete the references to requirements 3.b. and 3.d. and replace with 3.c.

(b) Delete the following course:

CSS	467	Bioenergy Feedstock Production	3

Add the following course:

CROP	467	Bioenergy Feedstock Production	3

(3) Under the **Biomedical Engineering** concentration replace the entire entry with the following:

To earn a Bachelor of Science degree in Chemical Engineering with a biomedical engineering concentration, students must complete requirements 1., 2., 3.a., 3.c. above and the following:

Both of the following courses (7 credits):

BMB	401	Comprehensive Biochemistry	4
CHE	481	Biochemical Engineering	3

One of the following courses (3 or 4 credits):

MGI	409	Eukaryotic Cell Biology	3
PSL	431	Human Physiology I	4

One of the following courses not taken above (3 credits):

BME	860	NanoEngineering in Biomedicine	3
CHE	883	Multidisciplinary Bioprocessing Laboratory	3
ME	494	Biofluid Mechanics and Heat Transfer	3
MSE	425	Biomaterials and Biocompatibility	3

One of the following courses not taken above (3 or 4 credits):

ANTR	350	Human Gross Anatomy for Pre-Health Professionals	4
BME	860	NanoEngineering in Biomedicine	3
CHE	883	Multidisciplinary Bioprocessing Laboratory	3
IBIO	341	Fundamental Genetics	4
ME	494	Biofluid Mechanics and Heat Transfer	3
MGI	409	Eukaryotic Cell Biology	3
MSE	425	Biomaterials and Biocompatibility	3
PSL	431	Human Physiology I	4

(4) Under the **Environmental** concentration make the following changes:

(a) Delete the references to requirements 3.b. and 3.d. and replace with 3.c.

(b) Delete the following course:

IBIO	446	Environmental Issues and Public Policy	3

(5) Under the **Food Science** concentration make the following changes:

(a) Delete the reference to requirements 3.d.

(b) Delete the following course:

CEM	482	Science and Technology of Wine Production	3

Add the following course:

FSC	482	Science and Technology of Wine Production	3

(6) Under the **Polymer Science and Engineering** concentration make the following changes:

(a) Delete the references to requirements 3.b. and 3.d. and replace with 3.c.

Effective Fall 2026.

2. Request to change the requirements in the **Bachelor of Science** degree in **Materials Science and Engineering** in the Department of Chemical Engineering and Materials Science.

The concentrations in the Bachelor of Science degree in Materials Science and Engineering are noted on the student's academic record when the requirements for the degree have been completed.

a. Under the heading **Requirements for the Bachelor of Science Degree in Materials Science and Engineering**, make the following change:

(1) In item 3. a. make the following changes:

(a) Delete the following courses:

CEM	152	Principles of Chemistry	3
ECE	345	Electronic Instrumentation and Systems	3

Add the following course:

CEM	152	Principles of Chemistry	4

(b) Change the total credits from '41' to '39'.

(c) Delete the note.

b. Under the heading **Concentrations in Materials Science and Engineering** make the following changes:

(1) Under **Biomedical Materials Engineering** make the following changes:

(a) In item 1., delete the following courses:

ANTR	350	Human Gross Anatomy for Pre-Health Professionals	3
CEM	251	Organic Chemistry I	3
CEM	351	Organic Chemistry I	3

Add the following courses:

ANTR	350	Human Gross Anatomy for Pre-Health Professionals	4
CEM	251	Organic Chemistry I	4
or			
CEM	351	Organic Chemistry I	4

(b) In item 1., change the total credits from '12' to '14'.

(c) Change the total credits for the concentration from '25' to '27'.

(2) Under **Polymeric Engineering** make the following changes:

(a) In item 1., delete the following courses:

CEM	251	Organic Chemistry I	3
CEM	252	Organic Chemistry II	3
CEM	351	Organic Chemistry I	3
CEM	352	Organic Chemistry II	3

Add the following courses:

CEM	251	Organic Chemistry I	4
or			
CEM	351	Organic Chemistry I	4
CEM	252	Organic Chemistry II	4
or			
CEM	352	Organic Chemistry II	4

(b) In item 1., change the total credits from ‘19’ to ‘21’.

(c) Change the total credits for the concentration from ‘22’ to ‘24’.

Effective Fall 2026.

3. Request to change the requirements in the **Bachelor of Science** degree in **Computer Science** in the Department of Computer Science and Engineering.

The concentrations in the Bachelor of Science degree in Computer Science are noted on the student’s academic record when the requirements for the degree have been completed.

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

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

CSE	320	Computer Organization and Architecture	3
CSE	380	Information Management and the Cloud	3

Add the following courses:

CSE	235	Tools, Teamwork, and Time	3
CSE	320	Computer Organization and Architecture	4
CSE	336	Software Engineering II	4
CSE	345	Fundamentals of Applied Intelligence	3
CSE	380	Data Management and the Cloud	4

(2) In item 3. b. add the following courses to the note:

CSE 336, CSE 345

(3) Change the total credits of item 3. b. from ‘32’ to ‘44’.

(4) In item 3. d. add the following courses:

CSE	416	Software Performance Engineering	3
CSE	446	AI Agents	3
CSE	475	Human-Computer Interaction	3

(5) Delete item 3. e. **Required Cognate**.

b. Under the heading **Concentrations in Computer Science** make the following changes:

(1) Under **Artificial Intelligence** add the following course under the list of ‘Three of the following courses not taken above (9 to 12 credits):

CSE	456	AI Agents	3

(2) Under **Computer Systems** add the following course:

CSE	416	Software Performance Engineering	3

(3) Under **Multimedia and Graphics** make the following changes:

(a) Under the list of 'Three of the following courses not taken above (8 or 9 credits)', delete the following courses:

FLM	230	Introduction to Film	3
FLM	260	Introduction to Digital Film and Emergent Media	3

Add the following courses:

CSE	475	Human-Computer Interaction	3
FLM	230	Introduction to Film	4
FLM	260	Introduction to Digital Film and Emergent Media	4

(4) Delete the **Software Engineering** concentration.

Effective Fall 2026.

4. Request to change the requirements in the **Minor** in **Computer Science** in the Department of Computer Science and Engineering.

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

(1) In item 2 delete the following courses:

CSE	320	Computer Organization and Architecture	3
CSE	380	Information Management and the Cloud	3

Add the following courses:

CSE	320	Computer Organization and Architecture	4
CSE	336	Software Engineering II	4
CSE	345	Foundations of Artificial Intelligence	3
CSE	380	Data Management and the Cloud	4
CSE	475	Human-Computer Interaction	3

Effective Fall 2026.

COLLEGE OF NATURAL SCIENCE

1. Request to establish a **Master of Science** degree in **Medical Neuroscience** in the College of Natural Science. The University Committee on Graduate Studies (UCGS) recommended approval of this request at its February 23, 2026 meeting.

a. **Background Information**:

The development of the Master of Science degree in Medical Neuroscience responds to several key considerations and market needs. Many working professionals in healthcare, biomedical research, and related fields seek advanced credentials to enhance their career prospects. The program specifically supports individuals pursuing career advancement, academic enhancement, or preparation for further graduate and professional study. Pre-health students and those seeking admission to medical, dental, physician assistant, and other health professions programs require strong foundational knowledge in neuroscience. Similarly, students planning doctoral study in neuroscience, psychology, or related disciplines benefit from comprehensive graduate-level preparation. The fully online format addresses the needs of diverse learners, including working professionals, those with geographic constraints, and students requiring flexible scheduling options. This delivery method expands access to high-quality neuroscience education beyond traditional on-campus offerings and complements and extends existing neuroscience offerings at Michigan State University while serving a distinct student population. The program shares core courses with the

Graduate Certificate in Medical Neuroscience, providing multiple pathways for students to pursue their academic and professional goals. The program's online delivery distinguishes it from existing in-person neuroscience courses, expanding access and serving students who cannot participate in traditional on-campus programs.

The Medical Neuroscience M.S. program positions MSU competitively within the national landscape of neuroscience graduate education. Many institutions offer either broad neuroscience programs or highly specialized clinical neuroscience tracks. This program fills a market gap by providing comprehensive medical neuroscience training that bridges basic science with clinical applications while remaining accessible to students with diverse academic backgrounds. While numerous institutions offer campus-based neuroscience master's programs, fewer provide high-quality online options. The fully online format positions MSU to serve a national student population seeking flexible, accessible graduate neuroscience education.

b. **Academic Programs Catalog Text**:

The Master of Science degree in Medical Neuroscience is a fully online degree program that provides rigorous graduate-level training in human neuroscience, designed for individuals seeking career advancement, academic enhancement, or preparation for graduate and professional school. The program emphasizes both cellular/molecular and systems-level understanding of the nervous system in health and disease, and includes training in current topics in neuroscience research, neuroethics, and the social determinants of health.

This flexible program supports a wide range of learners—from those preparing for professional or doctoral programs to those transitioning into neuroscience-related careers or seeking advancement in biomedical or healthcare industries.

Admission

To be considered for admission to the Master of Science Degree in Medical Neuroscience, students must:

1. Have a bachelor’s degree in a biological science background or in another area with equivalent work experience.
2. Have an undergraduate or graduate grade-point average or work experience that would indicate expected success in graduate school.
3. Write a reflective essay describing how the master’s program will enhance their professional and personal development.
4. Provide three letters of recommendation.
5. Submit a CV or resume.

Requirements for the Master of Science Degree in Medical Neuroscience

A total of 30 credits are required for the degree under Plan B (non-thesis).
The program is available only online.

					CREDITS
1.	Both of the following foundational courses (6 credits):				
	NEU	848		Cellular and Molecular Medical Neuroscience	3
	NEU	849		Medical Neuroscience Systems and Anatomy	3
2.	All of the following courses (14 credits):				
	NEU	842		Neuroethics	3
	NEU	846		Neurobiology of Nervous System Disorders	3
	NEU	847		Development of the Nervous System	3
	NEU	850		Neuroscience Seminar Series	3
	NEU	891		Special Problems in Medical Neuroscience	2
	NEU 850 is completed in three enrollments of 1 credit each.				
3.	One of the following options (3 or 4 credits):				
	a.	NEU	845	Neuroscience of Drug Use and Human Disorders	3
	b.	PHM	819	Principles of Drug-Tissue Interactions	2
		PHM	829	Neuropharmacology	2
	c.	PHM	431	Pharmacology of Drug Addition	3

4. One of the following courses (3 credits):

NUR	804	Statistics for the Healthcare Professional	3
PH	802	Biostatistics for Public Health	3
STT	421	Statistics I	3

Another statistics course may be used to fulfill this requirement with approval by the program director.

5. Complete 3 or 4 credits from the following:

BLD	830	Concepts in Molecular Biology	2
BMB	401	Comprehensive Biochemistry	4
LIN	463	Introduction to Cognitive Science	3
PH	803	Epidemiology and Public Health	3
PH	806	Environmental Factors of Health	3
PHM	817	Neurotoxicology	2

6. Successfully complete the Responsible and Ethical Conduct of Research (RECR) year 1 modules and 6 hours of discussion-based (RECR) education.
7. Pass a final oral examination or evaluation.

Effective Fall 2026.

2. Request to change the requirements for the **Graduate Certificate in Medical Neuroscience** in the Program in Neuroscience. The University Committee on Graduate Studies (UCGS) recommended approval of this request at its February 23, 2026 meeting.

a. Under the heading **Requirements for the Graduate Certificate in Medical Neuroscience** replace the entire entry with the following:

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

1. All of the following courses (9 credits):

NEU	846	Neurobiology of Nervous System Disorders	3
NEU	848	Cellular and Molecular Medical Neuroscience	3
NEU	849	Medical Neuroscience Systems and Anatomy	3

2. At least 3 credits from the following courses:

NEU	842	Neuroethics	3
NEU	845	Neuroscience of Drug Use and Human Disorders	3
NEU	847	Development of the Nervous System	3
PHM	431	Pharmacology of Drug Addiction	3
PHM	817	Neurotoxicology	2
PHM	819	Principles of Drug-Tissue Interactions	2
PHM	829	Neuropharmacology	2

Effective Fall 2026.

3. Request to change the requirements for the **Bachelor of Science** degree in **Computational Data Science** in the Department of Computational Mathematics, Science, and Engineering.

The concentration in the Bachelor of Science degree in Computational Data Science is noted on the student's academic record when the requirements for the degree have been completed.

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

(1) In item 3.a. delete the following courses:

MMG	141	Introductory Human Genetics	3
MMG	201	Fundamentals of Microbiology	3

Add the following courses:

MGI	141	Introductory Human Genetics	3
MGI	201	Fundamentals of Microbiology	3

(2) In item 3. b., make the following changes:

(a) Delete the following courses:

CSE	380	Information Management and the Cloud	3
CSE	480	Database Systems	3

Add the following course:

CSE	380	Data Management and the Cloud	4

(b) Change the total credits from ’47’ to ‘45’.

(3) Replace item 3.c. with the following:

Five courses selected from the following (15 to 18 credits):

CMSE	401	Methods for Parallel Computing	4
CMSE	402	Data Visualization Principles and Techniques	3
CSE	335	Software Engineering I	4
CSE	402	Biometrics and Pattern Recognition	3
CSE	415	Introduction to Parallel Computing	3
CSE	431	Algorithm Engineering	3
CSE	434	Autonomous Vehicles	3
CSE	440	Artificial Intelligence	3
CSE	446	AI Agents	3
CSE	471	Media Processing and Multimedia Computing	3
CSE	472	Computer Graphics	3
CSE	475	Human-Computer Interaction	3
CSE	480	Database Systems	3
CSE	492	Selected Topics in Data Science	3
MTH	451	Numerical Analysis I	3
MTH	468	Predictive Analytics	3
STT	464	Statistics for Biologists	3
STT	465	Bayesian Statistical Methods	3

(4) Delete item 3.d.

(5) Add the following concentration:

Concentration in Software Engineering
The department offers the following concentration to students wanting an area of specialization in their degree. The concentration is available to, but not required of, any student enrolled in the Bachelor of Science degree program in Computational Data Science. NOTE: Completing the Bachelor of Science degree in Computational Data Science with a concentration may require more than 120 credits. Upon completion of the required courses for a concentration, certification will appear on the student’s official transcript.

Software Engineering

To complete a Bachelor of Science degree in Computational Data Science with a software engineering concentration, students must complete the requirements for the bachelor’s degree, including the following:

The following courses (8 credits):

CSE	335	Software Engineering I	4
CSE	336	Software Engineering II	4

Effective Fall 2026.

PART II - NEW COURSES AND CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

ANS 426 Nutritional Immunology
Fall of every year. 3(3-0) P: ANS 313 R: Open to students in the Animal Science Major or in the Lyman Briggs Animal Science Coordinate Major. Not open to students with credit in ANS 826.

NEW Intersection of nutrition and dietary components with immune function and overall animal health.
Effective Fall Semester 2025

ANS 826 Nutritional Immunology
Fall of every year. 3(3-0) RB: Previous coursework in nutrition and immunology R: Open to graduate students in the Department of Animal Science. Not open to students with credit in ANS 426.

NEW Intersection of nutrition and dietary components with immune function and overall animal health.
Effective Fall Semester 2025

ENT 891 Special Topics in Entomology
Fall of every year. Spring of every year. Summer of every year. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.

NEW Emerging or important topics in entomological science and pest management.
Effective Fall Semester 2026

FW 207 Great Lakes: Biology and Management
Spring of every year. 3(3-0) ~~Interdepartmental with Community Sustainability~~
Living aquatic resources of the Great Lakes, environmental history, and biological resources and their management. Policy issues.
Effective Spring Semester 2027

FW 334 Human Dimensions of Fisheries and Wildlife Management
~~Fall of every year.~~ Spring of every year. 3(2-2) ~~P: (BS 162) and completion of Tier I writing requirement~~ P: (FW 101 and BS 162) and completion of Tier I writing requirement RB: IBIO 355 ~~R: Not open to freshmen or approval of department.~~ R: Open to juniors or seniors or approval of department.
Principles and application of social science in fisheries and wildlife conservation and management.
SA: FW 434
Effective Spring Semester 2027

FW 353 Marine Biology
Fall of every year. 3(3-0) P: (BS 162 or LB 144 or BS 182H) and completion of Tier I writing requirement R: Open to juniors or seniors or approval of department.
Integration of biology, chemistry, and physics on organisms and habitats in the ocean and estuaries. Life history, functional adaptation, reproduction and physiology of marine organisms.
SA: IBIO 353, ZOL 353
Effective Fall Semester 2026

FW 364 Ecological Problem Solving
Spring of every year. 3(2-2) ~~P: ((MTH 124 or concurrently) or (MTH 132 or concurrently) or (LB 118 or concurrently)) and (STT 224 or STT 231 or STT 421) and (IBIO 355 or BE 230)~~ P: (MTH 124 or MTH 132 or LB 118) and (STT 201 or STT 224 or STT 231 or STT 421) and (IBIO 355 or concurrently) R: Open to juniors or seniors or approval of department.
Application of ecological concepts and models to problems in natural resource and ecosystem management.
Effective Spring Semester 2026

FW 413 Wildlife Research and Management Techniques
Fall of every year. 3(2-3) P: (FW 101L) and completion of Tier I writing requirement R: Open to juniors or seniors or approval of department.
Field techniques used in collecting, analyzing, and communicating data on wild animal populations and their habitats. Field trips required.
Effective Fall Semester 2026

FW 416 Marine Ecology and Management
Fall of every year. 3(3-0) P: (BS 162 or BS 182H or LB 144) and Completion of Tier I Writing Requirement ~~RB: (IBIO 355) and (FW 110 or GLG 303 or IBIO 353)~~ RB: (IBIO 355) and (FW 110 or FW 353 or GLG 303) R: Open to juniors or seniors or approval of department.
Management of marine ecosystems and populations for ecological and socio-economic objectives. Anthropogenic impacts, mitigation, and marine resource conservation strategies. Field trips required.
Effective Fall Semester 2026

FW 444 Conservation Biology
~~Spring of every year.~~ Fall of every year. 3(3-0) ~~Interdepartmental with Integrative Biology~~ P: (BS 162 or BS 182H or LB 144 or FOR 340) and completion of Tier I writing requirement RB: IBIO 355 or PLB 441 R: Open to juniors or seniors or approval of department.
Ecological theories and methodologies to manage species, communities and genetic diversity on a local and global scale.
Effective Fall Semester 2026

FW 471 Ichthyology
Spring of every year. 4(3-3) ~~Interdepartmental with Integrative Biology~~ P: {BS 162 or BS 182H or LB 144} and Completion of Tier I Writing Requirement R: Open to juniors or seniors or approval of department.
Fish morphology and physiology. Development, behavior, evolution, and ecology. World fishes with emphasis on freshwater fishes. Field trips required.
Effective Fall Semester 2025

FW 474 Field and Laboratory Techniques for Aquatic Studies
Fall of every year. 3(2-3) ~~Interdepartmental with Integrative Biology~~ P: (FW 101L) and completion of Tier I writing requirement R: Open to juniors or seniors or approval of department.
Field and laboratory techniques for the investigation and analysis of lake and stream ecosystems and their biota. Field trips required.
SA: FW 470
Effective Fall Semester 2025

FW 828 Molecular Ecology and Conservation Genetics
~~Fall of even years.~~ Fall of odd years. 3(2-2) ~~Interdepartmental with Integrative Biology, Plant Biology~~ RB: IBIO 341 or CSS 350 or ANS 314
Population and evolutionary genetic principles applied to ecology, conservation, and management of fish and wildlife at the individual, population, and species level.
Effective Spring Semester 2026

FW 854 Uncertainty in Natural Resource Management
~~Spring of odd years.~~ Fall of even years. 3(2-2) RB: IBIO 355
Methods and challenges associated with accounting for uncertainty in natural resource decision making. Decision analysis, structured decision making, and adaptive management.
Effective Fall Semester 2026

FSC 858 Food Microbiology Omics and Fermentations
Spring of even years. 3(3-0) RB: FSC 440 or MGI 431 or MGI 301 R: Open to graduate students.
NEW Exploring microbial communities in food systems with emphasis on multi-omics approaches in microbial food safety, fermentations and human health.
Effective Spring Semester 2026

FOR 291 Careers in Forestry Seminar
Fall of every year. 1(1-0) R: Open to undergraduate students in the Forestry Major and open to undergraduate students in the Forestry Minor or approval of department.
NEW Professional development, career preparation and exploration of career pathways in Forestry.
Request the use of the Pass-No Grade (P-N) system.
Effective Fall Semester 2026

HRT 475 International Studies in Horticulture
Spring of odd years. Summer of every year. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: HRT 203 and HRT 204 R: Approval of department; application required.
REINSTATEMENT Study and travel experience emphasizing contemporary problems, issues, and trends in horticulture.
Effective Summer Semester 2026

PKG 811 Advanced CAD in Packaging
Fall of every year. Spring of every year. 3(2-2) R: Open to graduate students in the School of Packaging. Approval of department.
NEW Development of consumer packaging utilizing current technology tools.
Effective Fall Semester 2026

PKG 821 Computer Modeling and Simulation in Packaging
Fall of even years. 3(3-0) R: Open to graduate students in the School of Packaging. Approval of department.
NEW 3D modeling and analysis for packaging design.
Effective Fall Semester 2026

COLLEGE OF ENGINEERING

CHE 472 Polymeric Composite Materials Processing
Fall of every year. 3(2-3) Interdepartmental with Materials Science and Engineering ~~P: (CHE 311 or ME 332 or CE 321) or (MSE 360 and MSE 370)~~ P: (CHE 311 or CE 321) or (MSE 360 and MSE 370) or (ME 333 and ME 333L)
Manufacturing processes for thermoset and thermoplastic matrix composites. Mechanical and thermal evaluation of composites. Rheology and molding of fiber-filled materials.
Effective Fall Semester 2026

CHE 481 Biochemical Engineering
Fall of every year. 3(2-3) ~~P: {BMB 401 or (BMB 461 and BMB 462)} and CHE 431~~ P: BS 161 and CHE 431
Applications of microbiology and biochemistry to biochemical engineering. Kinetics and thermodynamics of biochemical reactors. Transport phenomena in biological systems. Bioreactor design and scale-up.
Effective Fall Semester 2026

CSE 235 Tools, Teamwork, and Time
Fall of every year. Spring of every year. 3(3-0) P: CSE 231
NEW Tools utilized by computing professionals, effective teamwork, and time management
Effective Fall Semester 2026

CSE 300 Social, Ethical, and Professional Issues in Computing
Fall of every year. Spring of every year. 1(1-0) P: CSE 232 ~~R: Open to undergraduate students in the College of Engineering.~~ R: Open to students in the Computational Data Science Major or in the Computer Science Major or in the Computer Science Minor or in the Lyman Briggs Computer Science Coordinate Major.

Professional responsibilities and informed judgments in computing practice based on legal and ethical principles. Local and global impacts of computing solutions on individuals, organizations, and society.
Effective Fall Semester 2026

CSE 320 Computer Organization and Architecture
Fall of every year. Spring of every year. Summer of every year. ~~3(3-0)~~ 4(4-0) P: CSE 232 and CSE 260 ~~R: Open to students in the Department of Computer Science and Engineering or in the Computer Engineering Major or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major or in the Computer Science Disciplinary Teaching Minor.~~ R: Open to students in the Applied Engineering Sciences Major or in the Computer Engineering Major or in the Computer Science Minor or in the Computer Science Major or in the Lyman Briggs Computer Science Coordinate Major. Not open to students with credit in ECE 331.

Boolean algebra and digital logic. Combinational and sequential circuits. Representations of data and instructions. Architecture and major components of computer systems. Assembly language programming and interfacing to high level languages. Assembler and linker processing.
SA: CPS 320
Effective Fall Semester 2026

CSE 331 Algorithms and Data Structures
Fall of every year. Spring of every year. 3(3-0) P: (CSE 232) and (CSE 260 or CMSE 202) ~~R: Open to students in the Department of Computer Science and Engineering or in the Computer Engineering Major or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major or in the Data Science Major and open to juniors or seniors in the College of Engineering.~~ R: Open to students in the Department of Computer Science and Engineering or in the Computer Engineering Major or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Data Science Coordinate Major or in the Data Science Major and open to juniors or seniors in the College of Engineering.

Design, analysis, and application of fundamental algorithms and data structures in computer science.
Effective Fall Semester 2026

CSE 335 ~~Object-oriented Software Design~~ Software Engineering I
Fall of every year. Spring of every year. 4(4-0) ~~P: CSE 232 and CSE 260~~ P: (CSE 232) and (CSE 260 or CMSE 381) ~~R: Open to students in the Department of Computer Science and Engineering or in the Computer Engineering Major or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major or in the Computer Science Disciplinary Teaching Minor.~~ R: Open to students in the Applied Engineering Sciences Major or in the Computational Data Science Major or in the Computer Engineering Major or in the Computer Science Minor or in the Computer Science Major or in the Electrical Engineering Major or in the Lyman Briggs Computer Science Coordinate Major.

Development of large software products, libraries, and product families. Object-oriented programming using inheritance and polymorphism. Design methods. Specification and the use of contracts to design reliable software. Configuration management and life-cycle issues.
SA: CSE 370
Effective Fall Semester 2026

CSE 336 Software Engineering II

Fall of every year. Spring of every year. 4(4-0) P: (CSE 335) and completion of Tier I writing requirement R: Open to students in the Computer Science Minor or in the Applied Engineering Sciences Major or in the Computational Data Science Major or in the Computer Engineering Major or in the Computer Science Major or in the Lyman Briggs Computer Science Coordinate Major.

NEW Development of large software systems using modern software engineering methodologies.
Effective Fall Semester 2026

CSE 345 Foundations of Artificial Intelligence

Fall of every year. Spring of every year. 3(3-0) P: CSE 331 R: Open to students in the Applied Engineering Sciences Major or in the Computational Data Science Major or in the Computer Engineering Major or in the Computer Science Minor or in the Computer Science Major or in the Lyman Briggs Computer Science Coordinate Major or in the Data Science Major or in the Lyman Briggs Data Science Coordinate Major.

NEW Understanding and applying the technologies that support modern artificial intelligence applications
Effective Fall Semester 2026

CSE 380 ~~Information Management and the Cloud~~ Data Management and the Cloud

Fall of every year. Spring of every year. ~~3(3-0)~~ 4(4-0) P: CSE 232 ~~R: Open to students in the College of Engineering or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Data Science Coordinate Major or in the Data Science Major.~~ R: Open to students in the Applied Engineering Sciences Major or in the Computational Data Science Major or in the Computer Engineering Major or in the Computer Science Minor or in the Computer Science Major or in the Lyman Briggs Computer Science Coordinate Major or in the Data Science Major or in the Lyman Briggs Data Science Coordinate Major.

~~Introduction to information management and cloud computing~~ Introduction to data management and cloud computing
Effective Fall Semester 2026

CSE 416 Software Performance Engineering

Fall of every year. 3(3-0) P: (CSE 331) and (CSE 320 or ECE 331) R: Open to undergraduate students in the College of Engineering or in the Department of Computer Science and Engineering or in the Lyman Briggs Computer Science Coordinate Major.

NEW This course provides a hands-on, project-based introduction to building scalable and high-performance software systems.
Effective Fall Semester 2026

CSE 431 Algorithm Engineering

Fall of every year. Spring of every year. 3(3-0) P: CSE 331 ~~R: Open to juniors or seniors in the College of Engineering or in the Computer Science Minor or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major.~~ R: Open to juniors or seniors in the College of Engineering. Not open to students with credit in CSE 830.

Algorithm analysis, design, implementation, and optimization for a broad range of problem categories including techniques to recognize and cope with intractable problems.
Effective Fall Semester 2026

CSE 435 ~~Software Engineering~~ Requirements Analysis and Software Engineering In Practice

Fall of every year. 3(3-0) ~~P: (CSE 331 and CSE 335) and completion of Tier I writing requirement~~ P: CSE 336 R: Open to juniors or seniors in the College of Engineering or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major.

~~Software engineering methods for reliable, reusable, and dependable software.~~ Requirements Analysis and Software Engineering methods for reliable, reusable, and dependable software.
Effective Fall Semester 2026

CSE 440 ~~Introduction to Artificial Intelligence~~ Artificial Intelligence
Fall of every year. Spring of every year. 3(3-0) P: (CSE 331) and (MTH 314 or ECE 280 or MTH 317H) R: Open to juniors or seniors in the College of Engineering or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major or in the Computer Science Minor or in the Data Science Major or in the Lyman Briggs Data Science Coordinate Major.
~~Fundamental algorithms and methods in intelligent systems and artificial intelligence.~~ Advanced algorithms and methods in intelligent systems and artificial intelligence.
SA: CPS 440
Effective Fall Semester 2026

CSE 446 AI Agents
Fall of every year. 3(3-0) P: CSE 335 or CSE 380 or CMSE 381 R: Open to undergraduate students in the College of Engineering or in the Department of Computer Science and Engineering or in the Lyman Briggs Computer Science Coordinate Major or in the Data Science Major or in the Lyman Briggs Data Science Coordinate Major. Not open to students with credit in CSE 846.
NEW The design, implementation, and evaluation of large language model (LLM)-based agents.
Effective Fall Semester 2026

CSE 475 Human-Computer Interaction
Spring of every year. 3(3-0) P: CSE 335 or CSE 476 or CSE 477 R: Open to undergraduate students in the College of Engineering or in the Department of Computer Science and Engineering or in the Lyman Briggs Computer Science Coordinate Major or in the Data Science Major or in the Lyman Briggs Data Science Coordinate Major.
NEW Principles of interaction between humans and interactive computing systems.
Effective Spring Semester 2027

CSE 499 Undergraduate Research
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.~~ A student may earn a maximum of 9 credits in all enrollments for this course. ~~R: Open to students in the Department of Computer Science and Engineering or in the Computer Engineering Major or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major. Approval of department.~~ R: Open to students in the Department of Computer Science and Engineering. Approval of department.
Independent undergraduate research in contemporary areas of computer science. Request the use of the Pass-No Grade (P-N) system.
Effective Fall Semester 2025

COLLEGE OF NATURAL SCIENCE

~~CJ 804~~
CEM 804 Crime Scene Investigation
~~Fall of odd years.~~ Spring of odd years. ~~1(1-0)~~ 1(0.5-0.5) R: Open to graduate students in the Forensic Science Major.
Introduction to crime scene investigation. Documentation, evidence collection, presumptive chemical and biological tests, and collection and preservation of impression evidence.
SA: CJ 804
Effective Fall Semester 2025

~~CJ 805~~
CEM 805 Survey in Forensic Science
Fall of even years. 3(3-0) ~~R: Open to students in the Forensic Science Major.~~ R: Open to graduate students in the Forensic Science Major.
Scientific analysis of physical evidence. Four major aspects of physical evidence using real criminal and civil cases: generation of physical evidence by criminal activity; collection and preservation of physical evidence; analysis of physical evidence by forensic science laboratory; presentation of scientific expert testimony in court.
SA: CJ 805
Effective Fall Semester 2025

~~CJ 819~~
CEM 819 ~~Forensic Analysis of Drugs and Alcohol~~ Analysis and identification of seized drugs
Fall of odd years. 3(1-5) R: Open to graduate students in the Forensic Science Major.
Techniques and processes in analysis of physical evidence including spectroscopy, chromatography, and microscopy. Emphasis on controlled substances.
SA: CJ 819
Effective Fall Semester 2025

~~CJ 820~~
CEM 821 Forensic Chemistry and Microscopic Evidence
Spring of odd years. 3(1-5) ~~RB: CJ 819~~ R: Open to graduate students in the Forensic Science Major.
~~Continuation of CJ 819. Analysis of trace evidence including hairs and fibers, paints and coatings, explosives and fire residues, glass and soil.~~ Analysis of trace evidence including hairs and fibers, paints and coatings, explosives and fire residues, glass and soil.
SA: CJ 820
Effective Fall Semester 2025

ISB 200 History of Life
~~Fall of every year. Spring of every year. Summer of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~P: ((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~
Life from its origin to the dawn of human history. Living things as both the products of evolutionary processes and as a major force driving evolution and altering the environment of planet earth.
Effective Spring Semester 2026

ISB 201 Insects, Globalization, and Sustainability
~~Fall of every year. Spring of every year. Summer of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~P: ((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~
The relationship between insects, human society, and the environment with an emphasis on ecological and evolutionary processes. Critical evaluation of current regional and global environmental problems and how they are effecting the development of a sustainable society.
Effective Spring Semester 2026

ISB 201L Insects, Globalization, and Sustainability Laboratory
Fall of every year. Spring of every year. 2(1-2) ~~P: ISB 201 or concurrently~~ P: (ISB 201 or concurrently) and (((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test)
Problem-based learning activities involved with observing, hypothesizing, experimenting, and analysis of data related to environmental science.
Effective Spring Semester 2026

ISB 202 Applications of Environmental and Organismal Biology
Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P: ((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~

Historical and recent development of ideas about behavior, ecological, and evolutionary processes. Critical evaluation of the use and misuse of human understanding of nature, emphasizing recent findings.
Effective Spring Semester 2026

ISB 204 Applications of Biomedical Sciences
~~Fall of every year. Spring of every year. Summer of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~P: ((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~

Historical and recent development of knowledge about cellular developmental or genetic processes. Critical evaluation of the use and misuse of scientific discoveries in these areas.
Effective Spring Semester 2026

ISB 208L Applications in Biological Science Laboratory
Fall of every year. Spring of every year. 2(1-2) ~~P: (ISB 202 or concurrently) or (ISB 204 or concurrently)~~ P: ((ISB 202 or concurrently) or (ISB 204 or concurrently) or (ISB 206 or concurrently)) and (((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test)

Problem solving activities based on observation and interpretation of selected biological systems.
SA: ISB 202L, ISB 204L
Effective Spring Semester 2026

ISB 210L Science and Society: Impacts of Daily Decisions Lab
~~Fall of every year. Spring of every year. Summer of every year.~~ Summer of every year. 2(1-2) ~~P: MTH 101 or MTH 103 or MTH 103B~~ P: ((MTH 101 or concurrently) or (MTH 103 or concurrently) or (MTH 103B or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test

Investigating and analyzing the environmental and personal impacts of daily decisions (fuels, energy, food, water, consumer goods).
Effective Spring Semester 2026

ISE 322 Foundational Earth Systems for Secondary Science Education
Spring of every year. ~~4(3-1)~~ 4(3-2) ~~R: Open to undergraduate students in the Department of Teacher Education.~~ R: Open to undergraduate students.

Exploration of natural, physical, and chemical processes in the Universe, the planets and the Earth, while developing skills necessary to instruct others on these processes.
Effective Spring Semester 2026

ISP 203A Understanding Earth: Global Change
Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P: (MTH 101 or MTH 103 or MTH 103B or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~ P: (MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test
Science as a way of knowing about natural and anthropogenic global change. Implications for societies.
Effective Spring Semester 2026

ISP 203B Understanding Earth: Natural Hazards and the Environment
~~Fall of every year. Spring of every year. Summer of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~P: (MTH 101 or MTH 103 or MTH 103B or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~ P: (MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test
Science as a way of knowing about natural hazards, as well as natural and anthropogenic environmental change. Implications for societies.
Effective Spring Semester 2026

ISP 203L Geology of the Human Environment Laboratory
Fall of every year. Spring of every year. 2(1-2) ~~P: (ISP 203A or concurrently) or (ISP 203B or concurrently)~~ P: ((ISP 203A or concurrently) or (ISP 203B or concurrently)) and ((MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test)
Exercises in the scientific method applied to earth materials and their impact on society.
Effective Spring Semester 2026

ISP 205 Visions of the Universe
Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P: (MTH 101 or MTH 103 or MTH 103B or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~ P: (MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test
Role of observation, theory, philosophy, and technology in the development of the modern conception of the universe. The Copernican Revolution. Birth and death of stars. Spaceship Earth. Cosmology and time.
Effective Spring Semester 2026

ISP 205L Visions of the Universe Laboratory
Fall of every year. Spring of every year. 2(1-2) ~~P: ISP 205 or concurrently~~ P: (ISP 205 or concurrently) and ((MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test)
Observations of the sky, laboratory experiments, and computer simulations exploring the development of the modern conception of the universe.
Effective Spring Semester 2026

ISP 209 The Mystery of the Physical World
Fall of every year. Spring of every year. 3(3-0) ~~P: (MTH 101 or MTH 103 or MTH 103B or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~ P: (MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test
Laws of physics through demonstrations and analyses of every day phenomena. Optics, mechanical systems and electromagnetic phenomena.
Effective Spring Semester 2026

ISP 220 Quarks, Spacetime, and the Big Bang
Fall of every year. 3(3-0) ~~P: (MTH 101 or MTH 103 or MTH 103B or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 201 or concurrently) or (LB 118 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~ P: (MTH 101 or MTH 103 or MTH 103B or MTH 116 or MTH 124 or MTH 132 or MTH 201 or LB 118 or STT 200 or STT 201) or designated score on Mathematics Placement test
Elementary particle physics and the Big Bang for non-scientists. A survey of particles and forces in the early universe as it is recreated at high energy particle colliders in laboratories around the world.
Effective Spring Semester 2026

MGI 404 Human Genetics
Fall of every year. 3(3-0) ~~P: IBIO 341~~ P: BS 161 or LB 145 or BS 181H R: Open to juniors or seniors.
Inheritance of human traits. Medical, molecular, physiological and forensic applications. Biochemical, clinical, and molecular genetics of human disease. Prenatal, pre-symptomatic, and clinical diagnosis. Ethical, legal and social considerations.
SA: MMG 404, ZOL 344, ZOL 404
Effective Fall Semester 2026

NEU 848 Cellular and Molecular Medical Neuroscience
Fall of every year. 3(3-0) RB: Undergraduate degree in the biological sciences R: Not open to doctoral students in the Program in Neuroscience. Not open to students with credit in NEU 841.
NEW Survey of the genetic, molecular, and cellular biology of the nervous system with an emphasis on medical applications.
Effective Fall Semester 2026

NEU 849 Medical Neuroscience Systems and Anatomy
Spring of every year. 3(3-0) P: NEU 848 RB: Undergraduate degree in the biological sciences R: Not open to doctoral students in the Program in Neuroscience. Not open to students with credit in NEU 841.
NEW Survey of the anatomy and physiology of neuronal mechanisms that regulate behavior, learning, and cognition with an emphasis on medical applications.
Effective Spring Semester 2027

NEU 850 Neuroscience Seminar Series
Fall of every year. Spring of every year. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. R: Open to graduate students in the Program in Neuroscience.
NEW Current research topics in neuroscience presented through weekly seminars featuring faculty, visiting scholars, and advanced graduate students.
Effective Fall Semester 2026

NEU 891 Special Problems in Medical Neuroscience
Spring of every year. 2(2-0) P: NEU 848 and NEU 849 and NEU 846 and NEU 847 and NEU 842 and NEU 850 RB: Undergraduate degree in the biological sciences R: Open to master's students in the Program in Neuroscience.
NEW Independent scholarly project for Plan B master's students integrating knowledge across medical neuroscience domains. Students will demonstrate mastery of program learning outcomes.
Effective Spring Semester 2027

AST 150 Introduction to the Astrophysics Major
Fall of every year. 1(1-0)
Skills and professional development to prepare astrophysics students for success academically and in their future careers. Topics may include scientific problem solving, finding research opportunities, and career preparation.
Effective Fall Semester 2026

AST 207 The Science of Astronomy
Fall of every year. 3(3-0) ~~P: ((PHY 231 or concurrently) or (PHY 183 or concurrently) or (PHY 193H or concurrently) or (LB 273 or concurrently)) and ((MTH 114 or concurrently) or (MTH 116 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 117 or concurrently) or (LB 118 or concurrently))~~ P: ((PHY 183 or concurrently) or (PHY 193H or concurrently) or (PHY 233 or concurrently) or (LB 273 or concurrently)) and ((MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently)) and (CMSE 201 or concurrently)
In-depth study of one topic in astronomy with emphasis on key discoveries. Topics may be cosmology, the solar system, and the life of stars.
Effective Fall Semester 2026

AST 208 Planets and Telescopes
Spring of every year. 3(2-2) ~~P: (PHY 183 or PHY 193H or LB 273) and ((MTH 103 or concurrently) or (MTH 114 or concurrently) or (MTH 116 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 117 or concurrently) or (LB 118 or concurrently))~~ P: ((PHY 184 or concurrently) or (PHY 294H or concurrently) or (LB 274 or concurrently) or (PHY 234 or concurrently)) and (MTH 132 or MTH 152H or LB 118) and (AST 207 and CMSE 201) ~~RB: AST 207~~ R: Open to undergraduate students in the Astrophysics Major or in the LB-Astrophysics Coordinate Major.
Origin and nature of the solar system. Planets of the solar system and other star systems. Determination of time and celestial coordinates. Astronomical instruments and observational methods.
SA: AST 303, AST 312
Effective Fall Semester 2026

AST 304 Stars
Fall of every year. 3(3-0) ~~P: (AST 208) and PHY 215 and (PHY 321 or concurrently)~~ P: (AST 208 and (PHY 215 or concurrently) and (PHY 321 or concurrently)) and ((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently)) R: Open to undergraduate students in the Astrophysics Major or in the LB-Astrophysics Coordinate Major.
Physical processes that determine the structure and evolution of stars. Observations of stars and star clusters. Spectra of stars.
Effective Fall Semester 2026

AST 308 Galaxies and Cosmology
Spring of every year. 3(3-0) ~~P: (AST 208) and (PHY 215 or concurrently) and (PHY 321 or concurrently)~~ P: (AST 208 and (PHY 215 or concurrently) and (PHY 321 or concurrently)) and ((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently)) R: Open to undergraduate students in the Astrophysics Major or in the LB-Astrophysics Coordinate Major.
The Milky Way. Structure and content of galaxies. Active galaxies and quasars. The expanding universe. Modern cosmological models.
SA: AST 402
Effective Fall Semester 2026

AST 310 Directed Studies
Fall of every year. Spring of every year. Summer of every year. 1 to 3 credits. ~~A student may earn a maximum of 4 credits in all enrollments for this course.~~ A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.
Individual study or project in astronomy or astrophysics under the direction of a faculty member.
Effective Fall Semester 2026

PHY 205 Directed Studies
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.~~ A student may earn a maximum of 6 credits in all enrollments for this course. P: (PHY 183 or concurrently) or (PHY 193H or concurrently) or (PHY 231 or concurrently) or (LB 273 or concurrently) R: Approval of department.
Guided individualized study in an area of physics.
Effective Fall Semester 2026

PHY 231 Introductory Physics I
Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P: MTH 114 or MTH 116 or MTH 124 or (MTH 132 or concurrently) or (MTH 152H or concurrently) or LB 117 or (LB 118 or concurrently)~~ P: MTH 114 or MTH 116 or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or LB 117 or (LB 118 or concurrently)
Mechanics, Newton's Laws, momentum, energy, conservation laws, thermodynamics, waves, sound.
SA: PHY 231C
Effective Fall Semester 2026

PHY 232 Introductory Physics II
Fall of every year. Spring of every year. Summer of every year. 3(3-0) ~~P: PHY 231 or PHY 183 or PHY 193H or PHY 221 or LB 273~~ P: (PHY 231 or PHY 183 or PHY 193H or PHY 221 or LB 273) and (MTH 114 or MTH 116 or MTH 124 or (MTH 132 or concurrently) or (MTH 152H or concurrently) or LB 117 or (LB 118 or concurrently))
Electricity and magnetism; optics; atomic, nuclear, and subnuclear physics.
SA: PHY 232C
Effective Fall Semester 2026

PHY 294H Honors Physics II-Electromagnetism
Spring of every year. 4(4-0) ~~P: (PHY 193H or PHY 183) and ((MTH 133 or concurrently) or (MTH 153H or concurrently) or (LB 119 or concurrently))~~ P: (PHY 193H or PHY 183 or LB 273) and ((MTH 133 or concurrently) or (MTH 153H or concurrently) or (LB 119 or concurrently)) Not open to students with credit in PHY 184.
Electricity and magnetism, circuits, electromagnetic waves and optics.
Effective Fall Semester 2026

PHY 305 Directed Studies
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.~~ A student may earn a maximum of 6 credits in all enrollments for this course. ~~P: (PHY 184 or concurrently) or (PHY 184B or concurrently) or (PHY 294H or concurrently)~~ P: (PHY 184 or concurrently) or (PHY 294H or concurrently) or (PHY 232 or concurrently) or (LB 274 or concurrently) R: Open to undergraduate students. Approval of department.
Guided individualized study in an area of physics.
Effective Fall Semester 2026

PHY 321 Classical Mechanics I
Fall of every year. Spring of every year. 3(3-0) ~~P: ((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently)) and CMSE 201 and ((PHY 215 or concurrently) or (PHY 215B or concurrently))~~ P: ((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently)) and ((PHY 215 or concurrently) and CMSE 201)
Newtonian point particles. Oscillations. One-particle chaos. Central-force motion. Systems of particles.
Effective Fall Semester 2026

PHY 405 Directed Studies
Fall of every year. Spring of every year. Summer of every year. 1 to 3 credits. ~~A student may earn a maximum of 5 credits in all enrollments for this course.~~ A student may earn a maximum of 6 credits in all enrollments for this course. ~~P: PHY 184 or PHY 184B or PHY 232 or PHY 232C or PHY 294H or LB 274~~ P: PHY 184 or PHY 294H or PHY 232 or LB 274 R: Approval of department.
Guided independent study of special topics.
Effective Fall Semester 2026

PHY 440 Electronics
Fall of every year. 4(3-3) ~~P: {{{{(PHY 184 or PHY 294H) or (PHY 232 and PHY 234B)} and PHY 192} or LB 274} and (((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently)) and completion of Tier I writing requirement)~~ P: {{{(PHY 184 or PHY 294H) or (PHY 232 and PHY 234)} and PHY 192} or LB 274} and (((MTH 235 or concurrently) or (MTH 340 or concurrently) or (MTH 347H or concurrently)) and completion of Tier I writing requirement)
Concepts of electronics used in investigating physical phenomena. Circuits, amplifiers, diodes, LEDs, transistors.
Effective Fall Semester 2026

PHY 471 Quantum Physics I
Fall of every year. 3(3-0) ~~P: (PHY 215 or PHY 215B) and (PHY 321 or concurrently) and (MTH 235 or MTH 340 or MTH 347H)~~ P: (PHY 215) and (PHY 321 or concurrently) and (MTH 235 or MTH 340 or MTH 347H)
Schroedinger equation, hydrogen atom, harmonic oscillator, and other one-dimensional systems.
Effective Fall Semester 2026

PHY 493 Introduction to Elementary Particle Physics
Spring of every year. 3(3-0) P: (PHY 471) and completion of Tier I writing requirement RB: PHY 472 ~~R: Open to undergraduate students in the Department of Physics and Astronomy or approval of department.~~ R: Open to undergraduate students in the Department of Physics and Astronomy or in the Lyman Briggs Physics Coordinate Major or approval of department. Not open to students with credit in PHY 803.
Introduction to concepts and theory for elementary particle physics.
Effective Fall Semester 2026

PHY 801 ~~Survey of Atomic and Condensed Matter Physics~~ Survey of Atomic and Cond. Mat. Physics
Spring of every year. 3(3-0) R: Open to graduate students in the Department of Physics and Astronomy or approval of department. ~~Not open to students with credit in PHY 491.~~
Survey of physics phenomena related to atomic, liquid and solid systems. Describe underlying microscopic principles responsible for properties of matter.
Effective Fall Semester 2026

PHY 802 Survey of Nuclear Physics
Spring of every year. 3(3-0) R: Open to graduate students in the Department of Physics and Astronomy or approval of department. ~~Not open to students with credit in PHY 492.~~
Survey of phenomena and conceptual foundations of nuclear physics.
Effective Fall Semester 2026