MICHIGAN STATE UNIVERSITY
University Committee on Curriculum

SUBCOMMITTEE A – AGENDA

Via Teams
March 27, 2025
1:30 p.m.

PART I – NEW ACADEMIC PROGRAMS AND PROGRAM CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

1. Request to change the requirements for the **Minor in Conservation, Recreation and Environmental Enforcement** in the Department of Fisheries and Wildlife.

   a. Under the heading **Minor in Conservation, Recreation and Environmental Enforcement** make the following changes:

      (1) Change the total number of credits for the minor from ’19 to 20’ to ’18 or 19’.

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

CSUS	278	Introduction to Conservation, Recreation and Environmental Enforcement	1

      (3) Under the heading **Environmental Attitudes, Policy and Law** delete the following course:

FW	434	Human Dimensions of Fisheries and Wildlife Management (W)	3

   Effective Summer 2025.

2. Request to establish a **Master of Science** degree in **Food Regulatory Affairs** in the Department of Food Science and Human Nutrition. The University Committee on Graduate Studies (UCGS) recommended approval of this request at its February 17, 2025 meeting.

   a. **Background Information**:

      The proposed Master of Science Degree in Food Regulatory Affairs was precipitated by a need frequently expressed by students and professionals in the food industry. Most regulatory professionals in the food industry obtain degrees in technical science areas such as food science, food engineering, nutrition sciences, etc. These scientific backgrounds generally do not include course work in laws or regulations. In 2024, the Institute for Food Laws and Regulations (IFLR) surveyed 26 major U.S. universities offering undergraduate food science degrees. We found that only 35% of programs require course work in food laws and regulations, and sometimes, the courses offered were only 1 credit hour of content. Thirty percent of programs surveyed offer a food law elective, and 35% offer no courses. Therefore, when these food science professionals move into regulatory capacities, typically a promotion within their company, they find themselves lacking in food law and policy development, regulatory implementation, regulatory affairs with government agencies, and regulatory management. While our current certificates in U.S. Food Laws and Regulations and International Food Laws and Regulations offer students important course work to assist them in their professional roles, many were seeking additional formal credentials. Through informal surveys of students and industry members, IFLR found that a master's degree in food regulatory affairs, specifically for food industry professionals, was an unfilled need for the professional development of food professionals. An additional consideration was that this program is designed for working professionals.

      To this end, the program is available entirely through online education. A primarily asynchronous online program provides flexibility and an interactive experience for professionals working all around the U.S. and the world. This allows students to continue in their professions while obtaining additional education.

      The Master of Science in Food Regulatory Affairs is not like any other degree program at MSU. The MSU College of Law offers a Master’s in Global Food Law, but its program is designed primarily for current lawyers, government regulators, and other food industry professionals who focus on legal issues, including legal representation. In contrast, IFLR’s Master’s in Food Regulatory Affairs is designed for non-lawyers professionals who work in

the regulatory sphere to ensure company compliance with food laws and regulations. Moreover, IFLR students will typically have a scientific background, and this master's program will apply that knowledge to building regulatory skills. Courses in the College of Law Master's Program in Global Food Law could be approved by IFLR food regulatory affairs advisors on a case-by-case basis.

Another sister program with a different focus is the College of Veterinary Medicine Master's in Food Safety. Food safety is rooted in the application of science to areas related to food. The food safety courses focus on pathogens, zoonotic diseases, antimicrobial resistance, and biotechnology. The scientific understanding and prevention of foodborne illnesses is significantly different from the focus on meeting regulatory requirements. Despite the differing focus, IFLR has a long history of collaboration with the College of Veterinary Medicine's Online Food Safety Program. IFLR's proposed master's program will include VM 810, Introduction to Food Safety and Professional Development as required course early in the program, and VM 826, Creating a Food Safety Culture, a pre-approved elective. Other courses could be approved by IFLR food regulatory affairs advisors on a case-by-case basis.

MSU offers a unique environment for offering this Master of Science. As a preeminent land grant university, MSU offers a collection of undergraduate and sister graduate programs unlike any other university. From the agricultural topics in the College of Agriculture and Natural Resources, such as Plant and Soil Sciences, Animal Science, Biosystems Engineering, Dietetics, Fisheries and Wildlife, Food Industry Management, Food Science, Horticulture, Nutrition Sciences, Packaging, to business and engineering majors to the Veterinary Science degree, all aspects of the food industry, farm to fork. This master's program would allow MSU to round out its offerings so that students can excel in any aspect of the food industry. In addition, MSU and the Institute for Food Laws and Regulations is already known for its exceptional food law certificate program. This master's degree builds upon IFLR's 26-year reputation in online food laws and regulation instruction.

b. **Academic Programs Catalog Text**:

The Master of Science Degree in Food Regulatory Affairs is an online program designed for students who wish to enhance their working knowledge of food regulatory affairs. This multidisciplinary program is suitable for students with various disciplines and experiences. It is particularly relevant to students involved in food law and policy development, regulatory implementation, regulatory affairs with government agencies, and regulatory management.

Admission

Applicants will be accepted after being reviewed by an admissions committee. An academic advisor will assist the student in planning a program of study that is related to the student's interests and professional goals and that fulfills college and university requirements.

Applicants must:

1. have completed a bachelor's degree from an accredited college or university with a minimum cumulative grade-point average of 3.0 on a 4.0 scale.
2. have completed 6 or more credits in food science, nutrition, dietetics, biology, or equivalent.
3. Demonstrate proficiency in written and spoken English and submit a letter of interest.

Applicants who do not meet all the requirements listed above may be admitted provisionally. Prerequisite (additional) course work may be required for provisional admission and does not count toward the degree.

Requirements for the Master of Science Degree in Food Regulatory Affairs

A total of 30 credits is required for the degree under Plan B and is available online only.

1. All of the following courses (15 credits):

			CREDITS
FSC	810	International Food Laws and Regulations	3
FSC	811	Food Laws and Regulations in the United States	3
FSC	820	Regulatory Leadership in Food Law	3
FSC	870	Capstone Applied Project in Food Regulatory Affairs	3
VM	810	Introduction to Food Safety and Professional Development	3

2. Complete 15 additional credits in electives approved by the student's academic advisor.
3. Complete and pass the final capstone applied project.

Effective Fall 2025.

3. Request to establish a **Agricultural Technology** certificate in **Urban and Community Forestry** in the Institute of Agricultural Technology. The University Committee on Undergraduate Education (UCUE) recommended approval of this request at its February 20, 2025 meeting.

a. **Background Information**:

Certificate programs and workshops in the areas of production agriculture and horticulture were developed and launched in 1894 as campus-based programs. In 1994, the Institute of Agricultural Technology started to offer programs in collaboration with community colleges. There is currently no certificate program available for individuals interested in Urban and Community Forestry within the state of Michigan. MSU is one of only two universities in the state that currently offers an IAT certificate or bachelor's degree in Forestry; therefore, IAT in partnership with the Department of Forestry, has the
experience and expertise to deliver a new certificate in Urban Community Forestry. If MSU can be the first university to offer such a program, we expect to bring in new students who would not otherwise consider our forestry programs.

The nation and state of Michigan face an overall shortage of trained graduates in the field of forestry, especially in urban forest management, where aging demographics will result in a wave of retirements in the coming years. In addition, as evidenced in letters of support for our MI DNR UCF IRA Grant, there is tremendous employer demand for trained urban and community foresters (e.g., Michigan Department of Natural Resources and International Society of Arboriculture – Michigan). These agency and industry partners have consistently stressed concerns in regard to shortages of trained graduates. Despite growing societal recognition of the importance of urban forests and trees and the growing demand for trained professionals, undergraduate enrollments in forestry have been in decline for decades. At the same time, there are limited options, especially for post-secondary and non-traditional students who are place-bound and unable to enroll in a traditional 4-year bachelor's program. Given these issues, there is a need to reinvigorate forestry education programs to meet the changing needs of forestry practice and to train the upcoming generation of forestry professionals.

b. **Academic Programs Catalog Text**:

The Urban and Community Forestry program at the MSU Institute for Agricultural Technology provides students with the knowledge and technical skills necessary to sustainably manage trees in an urban environment, both in Michigan and beyond. Students connect directly with urban forestry leaders and professionals to gain hands-on experience in areas such as tree identification, tree selection, planting and pruning, climbing and aerial work, tree health care and risk assessment, and more. Upon completion of the program, graduates are often in high demand in this growing industry, and often pursue careers as urban tree planting coordinators; arborists; vegetation mapping coordinators; and urban forest technicians.

Requirements for Urban and Community Forestry

Students must complete 48 credits from the following:

1. All of the following MSU courses (39 credits):

			CREDITS
AT	293	Professional Internship in Agricultural Technology	3
CSS	203	World of Soils	2
ENT	110	Applied Entomology of Economic Plants	3
FOR	111	Field Exploration of Urban and Community Forestry	1
FOR	112	Career Development in Urban and Community Forestry	1
FOR	113	Urban Tree Care Equipment and Worker Safety	2
FOR	114	Introduction to Climbing and Aerial Tree Work	1
FOR	120	Survey of Urban and Community Forestry	2
FOR	125	Methods of Engagement in Urban and Community Forestry	2
FOR	222	Forestry Field Methods	3
FOR	225	Urban Forestry Information Technology	3
FOR	235	Urban Tree Care Practicum	3

	FOR	240	Crew Leadership and Management in Arboriculture	2
	FOR	245	Capstone Experience in Urban and Community Forestry	2
	GEO	221	Introduction to Geographic Information	3
	GEO	221L	Introduction to Geographic Information Laboratory	1
	HRT	211	Landscape Plants I	3
	PLP	105	Fundamentals of Applied Plant Pathology	1
	PLP	105L	Fundamentals of Applied Plant Pathology Lab	1

2. Complete at a minimum of 9 elective credits from the list below or as approved by the program coordinator in the Institute of Agricultural Technology.

AT	45	Agricultural Communications	2
AT	71	Technical Mathematics	2
AT	195	Research and Practice in Agricultural Technologies	3
AT	202	Agricultural Regulation, Compliance and Safety	3
AT	214	Leadership Development in Agriculture and Natural Resources Industries	2
AT	221	Unmanned Aircraft Systems (UAS) in Agriculture	4
CSS	110	Computer Applications in Agronomy	2
CSUS	200	Introduction to Sustainability	3
HRT	213	Landscape Maintenance	2

Effective Fall 2025.

COLLEGE OF ENGINEERING

1. Request to change the **Admission to the College** statement in the **College of Engineering**. The University Committee on Undergraduate Education (UCUE) will consider this request at its March 20, 2025 meeting.

   a. Under the heading **Admission to the College**, add the following sentence in item 4.:

      Biosystems Engineering, Chemical Engineering and Materials Science and Engineering require CEM 151.

   Effective Fall 2025.

2. Request to change the **Graduation Requirements for All Majors** statement in the **College of Engineering**. The University Committee on Undergraduate Education (UCUE) will consider this request at its March 20, 2025 meeting.

   a. Under the heading **Graduation Requirements for All Majors**, add the following sentence in item 2. b.:

      Biosystems Engineering, Chemical Engineering and Materials Science and Engineering require CEM 151.

   Effective Fall 2025.

3. Request to change the requirements for the **Bachelor of Science** degree in **Technology Engineering** in the College of Engineering.

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

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

         (a) Change the total credits from ‘29’ to ‘26’, and delete the following:

            A basic math or science elective from a define course pool 3

(b) Reletter items 3. b. and 3. c. to items 3. c. and 3. d. respectively.

(c) Add the following item 3. b.:

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

BS	161	Cell and Molecular Biology	3
CEM	142	General and Inorganic Chemistry	3
CEM	143	Survey of Organic Chemistry	4
CEM	144	Organic Chemistry and Applications	3
CEM	152	Principles of Chemistry	3
ENT	205	Pests, Society and Environment	3
IBIO	150	Integrating Biology: From DNA to Populations	3
MGI	141	Introductory Human Genetics	3
MGI	201	Fundamentals of Microbiology	3
PLB	105	Plant Biology	3
PSL	250	Introductory Physiology	4
MTH	133	Calculus II	4
MTH	299	Transitions	4

Students cannot fulfill both the math/basic science elective and the University Bioscience requirement with the same course.

(d) In item 3. d. change the requirement to the following:

In consultation with their academic advisor, students must select one of following: Embedded Cybersecurity concentration OR Mechatronics concentration or the Smart Agricultural Systems minor. The concentration or minor will be noted on the student's academic record.

(e) In item 3. d. add the following minor:

Smart Agricultural Systems Minor

Students must complete a minimum of 16 credits from the following:

1. All of the following courses (10 credits):

BE	221	Introduction to Smart Agriculture	1
BE	321	Principles of Precision Agriculture	3
BE	421	Sensors and Robotics for Agricultural Systems	3
BE	422	Crop Modeling and Optimization	3

2. Two of the following courses (6 or 7 credits):

BE	449	Human Health Risk Analysis for Engineering Controls	3
BE	456	Electric Power and Control 3	
BE	481	Water Resources Systems Analysis and Modeling	3
BE	482	Engineering Ecological Treatment Systems	3
CSE	404	Introduction to Machine Learning	3
CSE	440	Introduction to Artificial Intelligence	3
CSE	480	Database Systems	3
CSE	482	Big Data Analysis	3
CSS	467	Bioenergy Feedstock Production	3
ECE	416	Digital Control	3
ECE	417	Robotics	3
ECE	431	Smart Sensor Systems	3
ECE	434	Autonomous Vehicles	3
ECE	477	Microelectronic Fabrication	3
ME	417	Design of Alternative Energy Systems	3
ME	451	Control Systems	4
ME	456	Mechatronic System Design	3

Effective Fall 2025.

4. Request to change the requirements in the **Bachelor of Science** degree in **Civil Engineering** in the Department of Civil and Environmental Engineering.

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

(1) In item 3. a., change the total credits from ‘42’ to ‘46’ and add the following courses:

CE	271	Introduction to Civil and Environmental Engineering	3
CE	361	Computational Methods in Civil Engineering	3
CE	496	Review for the CE and ENE Fundamentals of Engineering Exams	1

Delete the following course:

ENE	280	Principles of Environmental Engineering and Science	3

(2) In item 3. b. change ‘GLG 301’ to ‘GLG 203’.

(3) Delete items 3. c. and 3. d. and reletter item 3. e. to 3. c

(4) Reletter item 3. f. to 3. d. and add the following courses:

ENE	380	Principles of Environmental Engineering and Science	3
ENE	381	Environmental Chemistry	3

Delete the following course:

ENE	481	Environmental Chemistry: Equilibrium Concepts	3

Effective Fall 2025.

5. Request to change the requirements in the **Bachelor of Science** degree in **Environmental Engineering** in the Department of Civil and Environmental Engineering.

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

(1) In item 3. a., change the total credits from ‘53 to ‘57 and add the following courses:

CE	271	Introduction to Civil and Environmental Engineering	3
CE	496	Review for the CE and ENE Fundamentals of Engineering Exams	1
ENE	380	Principles of Environmental Engineering and Science	3
ENE	381	Environmental Chemistry	3

Delete the following courses:

ENE	280	Principles of Environmental Engineering and Science	3
ENE	481	Environmental Chemistry: Equilibrium Concepts	3

(2) In item 3. d. change ‘GLG 301’ to ‘GLG 203’.

(3) Delete item 3. e. and reletter item 3. f. to 3. e

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

BE	484	Water Resource Recovery Engineering	3
CE	473	Smart and Sustainable Building Design and Operations	3
CE	485	Landfill Design	3
ENE	472	Life Cycle Assessment of Energy Technologies	3

Delete the following course:

FW	414	Aquatic Ecosystem Management	3

Effective Fall 2025.

COLLEGE OF HUMAN MEDICINE

1. Request to change the requirements for the **Professional Program in Human Medicine** leading to the **Doctor of Medicine** (M.D.) degree. The University Committee on Graduate Studies (UCGS) will consider this request at its March 17, 2025 meeting.

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

      (1) In item 1. Change the total credits from '140' to '90' and delete the following courses:

FM	641	Family Medicine Clerkship in the Late Clinical Experience	6
HM	553	Medical School II	16
HM	554	Medical School III	16
HM	555	Medical School IV	16
HM	556	Medical School V	16
HM	653	Advanced Skills and Knowledge in Medical School III	3
HM	654	Advanced Skills and Knowledge in Medical School IV	3
HM	655	Advanced Skills and Knowledge in Medical School V	3
OGR	641	Obstetrics and Gynecology Clerkship in the Late Clinical Experience	6
PHD	641	Pediatric Clerkship in the Late Clinical Experience	6
SUR	641	Surgery in the Late Clinical Experience I	6
SUR	642	Surgery in the Late Clinical Experience II	6

      Add the following courses:

FM	641	Family Medicine Clerkship	9
HM	553	Medical School II	13
HM	603	Transition to Clerkships I	1
HM	673	Transition to Residency	3
OGR	641	Obstetrics and Gynecology Clerkship	9
PHD	641	Pediatric Clerkship	9
SUR	651	Surgery Clerkship	9

      (2) Renumber item 2. to item 3.

      (3) Add the following item 2.:

      2. One of the following combinations (32 credits):

a.	Two (2) semester series			
	HM	565	Integrated Medical School III	16
	HM	566	Integrated Medical School IV	16
b.	Three (3) semester series			
	HM	562	Medical School III	13
	HM	563	Medical School IV	13
	HM	564	Integrated Topics in Human Medicine	6

      (4) Delete item 3.

      (5) In item 4., make the following changes:

         (a) Change the requirement to 'Complete 28 weeks of Elective Clerkships (42 credits)'.

         (b) Add the following courses:

ANES	619	Introduction to Anesthesiology - An Anesthesia Primer	3
ANES	620	Chronic Pain Management	6
ANES	621	Concepts in Clinical Anesthesiology I	6
ANES	622	Concepts in Clinical Anesthesiology II	6
FM	614	Breastfeeding and Lactation	3
FM	615	Addiction Medicine	3
FM	619	Telemedicine Medicine Experiences in Rural Clinical Settings	3
FM	621	Advanced Addition Medicine	3
HM	606	Student-Designed Non-Clinical Elective	3 or 6
HM	607	Medical Reading Elective	3 or 6
HM	617	Introduction to Simulation Education Elective	3 or 6
HM	627	Interdisciplinary Exploration with Special Populations: Veterans Affairs	6
HM	628	Racism and Other Health Disparities	3
HM	634	Indigenous Community Health	3 or 6
HM	638	Lifestyle Medicine	3 or 6
HM	648	Care of Migrant and Seasonal Agricultural Workers Elective	3 or 6
MED	617	Sleep Medicine	3 or 6
RAD	610	Advanced Imaging	3
SUR	634	Neurosurgery Sub-Internship	6
SUR	635	Perioperative Trauma Medicine	6

b. Under the heading ***Oral Maxillofacial Surgery Pathway*** replace the entire entry with the following:

MSU-CHM provides an Oral Maxillofacial Surgery (OMFS) Pathway for students accepted to the College of Human Medicine who have successfully completed a D.D.S degree and have been accepted to the Henry Ford Hospital Oral Maxillofacial Surgery Residency Program. These students will begin the M2 year upon matriculation, and will complete the remainder of the M.D. program credits through the MD/OMFS residency track program, receiving a waiver for 41 credits. OMFS students must complete all listed Requirements for the Doctor of Medicine degree except for the differences outlined here:

- Exempted from taking HM 552 and HM 553.
- Instead of HM 562, must complete HM 544 Med School III, 10 credits.
- Instead of HM 564, must complete HM 549 Integrated Topics in Human Medicine, 9 credits.
- From the Critical Care Selectives, OMFS students must complete MED 643 Medicine Critical Care, 6 credits.
- Must complete a total of 30 credits of electives for graduation, and are exempted from 12 credits. One elective must be SUR 635 Perioperative Trauma Medicine, 6 credits.

Effective Fall 2025.

PART II - NEW COURSES AND CHANGES

COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

FSC 421 Food Laws and Regulations
~~Spring of odd years. Summer of even years.~~ Summer of every year. 3(3-0) P: HNF 150 or FSC 211 or AFRE 100

Adoption, interpretation, and enforcement of laws and regulations governing food processing and foodservice systems. Impact of regulation on food production, availability, marketing, and safety.
Effective Spring Semester 2025

FSC 812 Food Laws and Regulations in the European Union
~~Fall of every year. Spring of every year.~~ Fall of every year. 3(3-0) RB: (FSC 810) or food science, law, food safety. international development or related disciplines.

Introduction to the European Union (EU), the role of case law, official controls, the European Food Safety Authority, food labeling, food additives, food fortification, genetically modified foods, organic foods, imports, food safety, inspections, enforcement and compliance, and the role of science in EU food law.
Effective Spring Semester 2025

FSC 870 Applied Project in Food Regulatory Affairs
Fall of every year. Spring of every year. Summer of every year. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. RB: Open to degree-seeking graduate students admitted to the master's program in food regulatory affairs who have completed at least 24 credits for their food regulatory affairs degree. R: Open to master's students in the Department of Food Science and Human Nutrition. Approval of department.

NEW Capstone of the master's degree in food regulatory affairs. The project applies what the student has learned by addressing a research, theoretical, or practical problem in food regulatory affairs. Students will work with the course instructors as their advisors, mentors, and evaluators for their applied project. A second faculty member may serve as a subject matter expert advisor. In addition to writing the project proposal, the student will produce an outline, a preliminary draft, and a final paper (>20 pages).
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2025

HNF 850 Nutrition and Adult Mental Health
Spring of every year. 3(3-0) A student may earn a maximum of 3 credits in all enrollments for this course. RB: Undergraduate degree in Dietetics R: Open to master's students in the College of Agriculture and Natural Resources or in the Department of Food Science and Human Nutrition or in the Nutrition and Dietetics Major or approval of department.

NEW This course explores the intersection of where nutrition, food and the registered dietitian plays a role in supporting individuals with mental and behavioral health related diagnoses and care settings.
Effective Spring Semester 2026

FOR 128 Practical Computing and Data Science Tools
~~Spring of every year.~~ Fall of every year. 3(2-2)

Foundational skills to work efficiently in a computing environment. Introduction to exploratory data analysis, spreadsheets, and R programming language.
Effective Fall Semester 2025

FOR 335 Business Innovation Toward a Sustainable BioEconomy
Fall 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.~~ Role of forest bioproducts in business innovation to develop sustainable businesses and communities. Addresses business principles and practices, entrepreneurial leadership, bioproducts supply-chains analysis and principles of life cycle analysis.
Effective Fall Semester 2025

FOR 831 ~~Forest Biogeochemistry and Global Climate Change~~ Forest Biogeochemistry and Climate Change
~~Fall of every year.~~ Summer of every year. 3(3-1) RB: Background course in ecology
Biogeochemical cycling of carbon and nutrients within forest ecosystems. Disturbance, harvesting and forest management effects on the exchange of greenhouse gases between forest ecosystems and the atmosphere.
Effective Summer Semester 2025

FOR 838 Forest Resource Economics and Finance
Spring of every year. 1(1-0) R: Open to graduate students in the Department of Forestry .
NEW Basic economic and social science principles and techniques that govern human consumption and production of forest resources, including investment and benefit-cost. Offered first half of semester.
Effective Spring Semester 2025

FOR 845 Nature and Health
Spring of every year. 3(3-0) RB: Prior coursework in social science or health-related disciplines.
NEW Catalog Course Description: Multidisciplinary theories, concepts, and methods for understanding contributions of nature to human health and well-being. Application of environmental justice principles to address inequities in access to nature and health disparities.
Effective Spring Semester 2026

COLLEGE OF ENGINEERING

CE 271 Introduction to Civil and Environmental Engineering
Fall of every year. 3(2-2) A student may earn a maximum of 3 credits in all enrollments for this course. P: (EGR 100 and EGR 102) and completion of Tier I writing requirement R: Open to undergraduate students in the College of Engineering.
NEW Introduction to the civil and environmental engineering professions. Overview of the primary subject areas in civil and environmental engineering, cultural and societal impacts of engineering decisions, sustainability, economics, data analysis, technical communication, and professional practice. Applications of civil and environmental engineering in daily life.
Effective Fall Semester 2025

CE 305 Introduction to Structural Analysis
Fall of every year. Spring of every year. 3(3-0) ~~P: ME 222 and (CE 273 or concurrently) and (CE 274 or concurrently)~~ P: ME 222 and (CE 273 or concurrently) and (CE 274 or concurrently) and CE 271 R: Open to juniors or seniors in the Department of Civil and Environmental Engineering.
Theory of structural analysis for statically determinate structures. Qualitative structural analysis and behavior. Load estimation and placement. Introduction to structural analysis computer software. Introduction to statically indeterminate structures.
Effective Fall Semester 2025

CE 312 Soil Mechanics
Fall of every year. Spring of every year. 4(3-3) ~~P: ME 222 and (CE 273 or concurrently) and (CE 274 or concurrently)~~ P: (ME 222 and (CE 273 or concurrently) and (CE 274 or concurrently) and (CE 271 or concurrently)) and completion of Tier I writing requirement R: Open to juniors or seniors in the Department of Civil and Environmental Engineering and open to juniors or seniors in the Biosystems Engineering major.
Engineering properties of soil and their measurement. Effective-stress concept. Permeability and seepage. Compaction. Consolidation, shear strength, and stress-strain behavior.
Effective Fall Semester 2025

CE 321 Introduction to Fluid Mechanics
Fall of every year. Spring of every year. 4(3-2) ~~P: (MTH 235) and CE 221 and Completion of Tier I Writing Requirement~~ P: (MTH 235) and CE 221 and ((CE 271 or (BE 230 or concurrently)) and completion of Tier I writing requirement) ~~R: Open to juniors or seniors in the Department of Civil and Environmental Engineering or in the Biosystems Engineering Major.~~ R: Open to juniors or seniors in the Department of Biosystems and Agricultural Engineering or in the Biosystems Engineering Major or in the Civil Engineering Major or in the Environmental Engineering Major. Not open to students with credit in ME 332.
Fluid properties, fluid statics, fluids in motion. Conservation of mass, energy, and momentum. Dimensional analysis and similitude. Internal and external flows. Applications.
Effective Fall Semester 2025

CE 337 Civil Engineering Materials
Fall of every year. Spring of every year. 4(3-3) ~~P: (ME 222 or concurrently) and (CE 273 or concurrently) and (CE 274 or concurrently)~~ P: ((ME 222 or concurrently) and (CE 273 or concurrently) and (CE 274 or concurrently) and CE 271) and completion of Tier I writing requirement R: Open to juniors or seniors in the Department of Civil and Environmental Engineering.
Common civil engineering construction and paving materials: aggregates, inorganic cements, asphalts, concretes, wood, and steel. Composition, structure, physical and mechanical properties, tests, and production mix design.
Effective Fall Semester 2025

CE 341 Transportation Engineering
Fall of every year. Spring of every year. 3(3-0) ~~P: ((MTH 234 or concurrently) or (MTH 254H or concurrently) or (LB 220 or concurrently)) and (((CE 273 or concurrently) and (CE 274 or concurrently)) and completion of Tier I writing requirement) and ((CE 372 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently))~~ P: ((MTH 234 or concurrently) or (MTH 254H or concurrently) or (LB 220 or concurrently)) and (((CE 273 or concurrently) and (CE 274 or concurrently) and CE 271) and completion of Tier I writing requirement) and (CE 372 or concurrently) ~~R: Open to juniors or seniors in the Department of Civil and Environmental Engineering or in the Urban and Regional Planning Major.~~ R: Open to juniors or seniors in the Department of Civil and Environmental Engineering.
Fundamentals of transportation planning, traffic flow and level-of-service, traffic signal design, geometric design of highways, and highway safety.
~~SA: CE 346~~
Effective Fall Semester 2025

~~CE 461~~
CE 361 Computational Methods in Civil Engineering
Spring of every year. ~~3(3-2)~~ 3(3-0) ~~P: (EGR 102 and CE 221) and (MTH 235 or MTH 340 or MTH 347H)~~ P: (EGR 102 and CE 221 and CE 271) and (MTH 235 or MTH 340 or MTH 347H) R: Open to juniors or seniors or graduate students in the Civil Engineering Major. Not open to students with credit in ME 361.
Theoretical, numerical, and computational methods for civil engineering problems. Physical modeling, numerical techniques, and programming methods. Focus on civil engineering dynamics, solving systems of differential equations, and visualizing the results.
SA: CE 390
Effective Fall Semester 2025

CE 400 Structural Mechanics
Fall of every year. 3(3-0) ~~P: CE 305~~ P: CE 305 and CE 361 R: Open to juniors or seniors or graduate students in the College of Engineering.
Matrix methods of structural analysis. Flexibility method. Direct stiffness method for plane structures. Elastic supports, inclined supports, member releases and non-prismatic members. Application software.
Effective Fall Semester 2025

CE 405 Design of Steel Structures
Spring of every year. 3(3-0) P: CE 305 R: Open to juniors or seniors or graduate students in the Department of Civil and Environmental Engineering or in the College of Engineering.
Design of steel beams, columns, tension members and connections. Stability and plastic strength.
Effective Fall Semester 2025

CE 406 Design of Concrete Structures
Fall of every year. 3(3-0) P: CE 305 and CE 337 R: Open to juniors or seniors or graduate students in the Department of Civil and Environmental Engineering or in the College of Engineering.
Design of reinforced concrete beams, slabs, columns and footings.
Effective Fall Semester 2025

CE 407 Materials Engineering: Properties, Selection and Processing
Spring of every year. 3(3-0) P: CE 221 and ME 222 RB: MSE 250 ~~R: Open to juniors or seniors in the Chemical Engineering Major or in the Mechanical Engineering Major or in the Civil Engineering Major.~~ R: Open to juniors or seniors.
General families of materials, materials design process for civil and environmental engineering problems, structural materials properties, processing methods and environment, microstructure of materials, structural materials selection by utilizing bubble charts.
Effective Fall Semester 2025

CE 418 Geotechnical Engineering
Fall of every year. 3(3-0) ~~P: CE 312 and (GLG 201 or GLG 301)~~ P: (CE 312) and (GLG 201 or GLG 203) R: Open to juniors or seniors or graduate students in the College of Engineering.
Shallow foundation design: bearing capacity, stress distribution, and settlement analysis. Pile foundations. Design of retaining structures, including rigid walls, braced excavations, and sheet-pile walls. Stability of slopes and embankments.
Effective Fall Semester 2025

CE 431 Design and Analysis for New and Rehabilitated Pavements
Fall of every year. ~~4(4-0)~~ 3(3-0) P: CE 337 R: Open to juniors or seniors or graduate students in the College of Engineering.

~~Highway and airfield pavement structural design. Performance measures. Failure mechanisms. Popular thickness design procedures for new and rehabilitated pavements. Design considerations for surface friction, pavement joints, and drainage.~~ Highway and airfield pavement structural design. Performance measures. Failure mechanisms. Current thickness design procedures for new and rehabilitated pavements. Design considerations for surface roughness, pavement joints, and drainage.
Effective Fall Semester 2025

CE 444 Principles of Traffic Engineering
Fall of every year. 3(3-0) P: CE 341 R: Open to juniors or seniors or graduate students in the Civil Engineering Major.

Driver and vehicle characteristics affecting traffic flow and safety. Speed, density, capacity relationships. Signal control in street networks. Freeway management systems. Risk management and liability.
Effective Fall Semester 2025

CE 448 Transportation Planning
Spring of every year. 3(3-0) P: CE 341

Transportation planning process and procedures. Estimation of travel demand using traditional models of trip generation, trip distribution, modal split, and traffic assignment. Use of "quick-response" procedures. Traffic impact of new facilities.
Effective Fall Semester 2025

CE 449 Highway Design
~~Fall of every year.~~ Spring of every year. 3(3-0) P: CE 341 R: Open to juniors or seniors or graduate students in the College of Engineering.

~~Geometric design of highways. Operation, capacity, safety, and geometric features. Alignment, drainage and pavement design. Use of CAD systems in preparing contract plans.~~ Geometric design of highways. Design controls and standards, alignments, cross-sections, sight distances, highway capacity, safety, traffic control, and drainage. Use of CAD systems
Effective Fall Semester 2025

CE 471 Construction Engineering - Equipment, Methods and Planning
Spring of every year. 3(3-0) P: (CE 305 and CE 312 and CE 337) or (CMP 305 and CMP 322) ~~R: Open to juniors or seniors or graduate students in the College of Engineering or in the Department of Management or in the Construction Management major.~~ R: Open to juniors or seniors or graduate students in the Department of Civil and Environmental Engineering or in the School of Planning, Design and Construction.

Engineering and construction fundamentals of earthwork operations, moving of materials, concrete construction, formwork, false work, and other temporary structures. Relationship to a construction project's constructability, cost, and schedule.
Effective Fall Semester 2025

CE 473 Smart and Sustainable Building Design and Operations
~~Spring of odd years.~~ Fall of every year. 3(3-0) ~~Interdepartmental with Environmental Engineering~~ P: CE 371 or approval of department

Elements of the design and operation of smart and sustainable buildings. Current and future energy-related challenges of existing buildings.
Effective Fall Semester 2025

CE 485 Landfill Design
Spring of every year. 3(3-0) ~~Interdepartmental with Environmental Engineering P: ENE 280 and CE 321~~ P: CE 321 RB: CE 312

Geotechnical and environmental design of solid waste landfills.
Effective Fall Semester 2025

CE 495 Senior Design in Civil and Environmental Engineering
Fall of every year. Spring of every year. 4(2-3) ~~P: (CE 274 and CE 371 and CE 372) and (ENE 421 or ENE 422 or ENE 483 or ENE 489 or CE 418 or CE 431 or CE 405 or CE 406 or CE 444 or CE 449) and (ENE 421 or ENE 422 or ENE 483 or ENE 489 or CE 405 or CE 406 or CE 418 or CE 431 or CE 444 or CE 449) and (ENE 421 or ENE 422 or ENE 483 or ENE 489 or CE 405 or CE 406 or CE 418 or CE 431 or CE 444 or CE 449)~~ P: (CE 274 and ENE 371 and CE 372) and (ENE 421 or ENE 422 or ENE 483 or ENE 489 or CE 418 or CE 431 or CE 405 or CE 406 or CE 444 or CE 449) and (ENE 421 or ENE 422 or ENE 483 or ENE 489 or CE 405 or CE 406 or CE 418 or CE 431 or CE 444 or CE 449) and (ENE 421 or ENE 422 or ENE 483 or ENE 489 or CE 405 or CE 406 or CE 418 or CE 431 or CE 444 or CE 449) and (CE 361 or ENE 380) R: Open to seniors in the Civil Engineering Major or in the Environmental Engineering Major.
Preliminary design. Application of design concepts in civil engineering. Integrated design solutions using geotechnical, hydrological, pavement, structural, environmental, and transportation considerations. Planning the design process. Design Specifications. Cost. Written and oral presentations. Issues of professional practice.
Effective Fall Semester 2025

CE 496 Review for the CE and ENE Fundamentals of Engineering Exams
Fall of every year. Spring of every year. 1(1-0) ~~P: CE 495 or concurrently~~ P: (CE 495 or concurrently) or (BE 485 or concurrently) R: Open to seniors or graduate students in the Biosystems Engineering Major or in the Civil Engineering Major or in the Environmental Engineering Major or in the Chemical Engineering Major.
~~Review of general, civil, and environmental engineering topics in preparation for sitting the NCEES Fundamentals of Engineering Exam.~~ Review of general, civil, and environmental engineering topics in preparation for the NCEES Fundamentals of Engineering Exam
~~Request the use of the Pass-No Grade (P-N) system.~~
Effective Fall Semester 2025

~~CE 371~~
ENE 371 Sustainable Civil and Environmental Engineering Systems
Fall of every year. Spring of every year. 3(3-0) ~~Interdepartmental with Environmental Engineering~~ P: (MTH 234 or concurrently) or (LB 220 or concurrently) or (MTH 254H or concurrently) R: Open to juniors or seniors in the Applied Engineering Sciences Major or in the Energy Minor or in the Civil Engineering Major or in the Environmental Engineering Major.
Principles and tools of sustainable design and engineering economics in Civil and Environmental Engineering.
SA: CE 272
Effective Fall Semester 2025

~~ENE 280~~
ENE 380 Principles of Environmental Engineering and Science
~~Fall of every year. Spring of every year.~~ Fall of every year. 3(3-0) ~~Interdepartmental with Civil Engineering~~ P: (CEM 141 or CEM 151 or LB 171) and (MTH 133 or MTH 153H or LB 119) P: (CEM 142 or CEM 152 or LB 172) and (MTH 133 or MTH 153H or LB 119) and CE 271
~~Analysis of environmental problems and engineering solutions based on physical, chemical, and biological processes. Mass balance modeling of contaminant fate, transport and removal in environmental media.~~ Physical, chemical and biological processes related to environmental science and engineering. Analysis of environmental problems and solutions. Mass balance modeling of contaminant fate, transport and removal in environmental media engineering.
Effective Fall Semester 2025

~~ENE 481~~

ENE 381 ~~Environmental Chemistry: Equilibrium Concepts~~ Environmental Chemistry

Fall of every year. 3(3-0) ~~Interdepartmental with Civil Engineering~~ ~~P: {(CEM 141 and CEM 142) or (CEM 151 and CEM 152) or (CEM 181H and CEM 182H) or (LB 171 and LB 172)} and (ENE 280 or BE 230 or GLG 201 or GLG 301 or approval of department) and ((CHE 201 or concurrently) or (CEM 251 or concurrently))~~ P: {(CEM 141 and CEM 142) or (CEM 151 and CEM 152) or (CEM 181H and CEM 182H) or (LB 171 and LB 172)} and ((ENE 380 or concurrently) or BE 230 or GLG 201 or GLG 203 or approval of department) and ((CHE 201 or concurrently) or (CEM 251 or concurrently)) R: Open to sophomores or juniors or seniors or graduate students in the Department of Biosystems and Agricultural Engineering or in the Department of Chemical Engineering and Materials Science or in the Department of Civil and Environmental Engineering or in the Department of Earth and Environmental Sciences.

Chemistry of environmental systems and air, water, and soil pollutants as applied to environmental engineering.

Effective Fall Semester 2025

ENE 421 Engineering Hydrology

~~Fall of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~Interdepartmental with Civil Engineering~~ ~~P: (CE 321) and (GLG 201 or GLG 301) and (CE 372 or STT 351)~~ P: (CE 321) and (GLG 201 or GLG 203) and (CE 372 or STT 201 or STT 231 or STT 351) R: Open to juniors or seniors or graduate students in the College of Engineering or in the College of Natural Science or in the Department of Plant, Soil and Microbial Sciences.

Hydrologic design of storm water systems. Equilibrium hydrograph analysis, unit hydrographs, infiltration, hydrograph synthesis, and reservoir routing. Groundwater: Darcy's law, flow nets, well hydraulics, design of capture wells.

Effective Fall Semester 2025

ENE 422 Applied Hydraulics

Spring of every year. 3(2-2) ~~Interdepartmental with Civil Engineering~~ P: CE 321 or ME 332 R: Open to juniors or seniors or graduate students in the College of Engineering.

Fundamentals of open-channel flow. Rapidly and gradually varied nonuniform flow analysis. Confined flows past submerged bodies, in pipe networks, and in turbo machinery. Design applications.

Effective Fall Semester 2025

ENE 472 Life Cycle Assessment of Energy Technologies

~~Spring of every year.~~ Fall of every year. 3(2-2) ~~Interdepartmental with Civil Engineering~~ ~~P: CE 371 or approval of department~~ P: ENE 371 or approval of department R: Open to students in the College of Engineering.

Use of life-cycle assessment (LCA) for energy technologies to evaluate trade-offs between various energy options and guide energy choices.

Effective Fall Semester 2025

ENE 480 Environmental Measurements Laboratory

Fall of every year. 2(1-3) ~~Interdepartmental with Civil Engineering~~ ~~P: (CEM 161 or CEM 185H or LB 171L) and ENE 280 and (CEM 142 or CEM 152 or CEM 182H or LB 172) and ((ENE 481 or concurrently) or (ENE 483 or concurrently)) and CE 372 and CE 321~~ P: (CEM 161 or CEM 185H or LB 171L) and ENE 380 and (CEM 142 or CEM 152 or CEM 182H or LB 172) and (ENE 381 or concurrently) and CE 372 and CE 321 R: Open to juniors or seniors or graduate students in the College of Engineering.

Basic chemical and microbiological methods used in the analysis of environmental media. Laboratory safety, quality assurance, quality control, and statistics used in laboratory analysis.

Effective Fall Semester 2025

ENE 483 Water and Wastewater Engineering
Fall of every year. 4(3-2) ~~Interdepartmental with Civil Engineering~~ ~~P: (ENE 280 or BE 230) and (CE 321 or CHE 311)~~ P: (ENE 380 or BE 230) and (CE 321 or CHE 311) R: Open to juniors or seniors or graduate students in the College of Engineering.
Engineering and scientific basis and design of physical, chemical and biological methods for the treatment of drinking water and wastewater. Operation process selection and design. Field trips required.
Effective Fall Semester 2025

ENE 487 Microbiology for Environmental Science and Engineering
Spring of every year. 3(3-0) ~~Interdepartmental with Civil Engineering~~ ~~P: ENE 280~~ P: (ENE 380) and completion of Tier I writing requirement
Fundamentals of microbiology. Application of these concepts to environmental processes such as wastewater treatment, human health and bioremediation.
Effective Fall Semester 2025

ENE 489 Air Pollution: Science and Engineering
Spring of every year. 3(3-0) ~~Interdepartmental with Civil Engineering~~ ~~P: (CEM 141 or CEM 151 or LB 171) and (MTH 133 or MTH 153H or LB 119) and (ENE 280 or BE 230) and (CE 321 or CHE 311) and (CE 372 or CHE 316) and ((ME 201 or concurrently) or (BE 351 or concurrently) or (CHE 321 or concurrently))~~ P: (CEM 141 or CEM 151 or LB 171) and (MTH 133 or MTH 153H or LB 119) and (ENE 380 or BE 230) and (CE 321 or CHE 311) and (CE 372 or CHE 316) and ((ME 201 or concurrently) or (BE 351 or concurrently) or (CHE 321 or concurrently)) R: Open to juniors or seniors or graduate students in the College of Engineering.
Basic physical and chemical principles governing indoor and atmospheric air pollutant fate, transport and control technologies.
Effective Fall Semester 2025

CSE 260 Discrete Structures in Computer Science
Fall of every year. Spring of every year. Summer of every year. 4(5-0) ~~P: MTH 133 or MTH 126 or MTH 153H or LB 119~~ P: MTH 124 or MTH 132 or MTH 152H or LB 118
Propositional and first order logic. Equivalence and methods of proof. Basics of counting. Set operations, relations, functions. Grammars and finite state automata. Discrete probability. Applications to computer science and engineering.
SA: CPS 260
Effective Fall Semester 2025

CSE 380 Information Management and the Cloud
Fall of every year. Spring of every year. 3(3-0) 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 Computer Science Major.~~ 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.
Introduction to information management and cloud computing
Effective Fall Semester 2025

CSE 402 Biometrics and Pattern Recognition
Fall of every year. 3(3-0) ~~P: (CSE 331) and (STT 351 or STT 380 or STT 430 or STT 441) and MTH 314 and (MTH 234 or MTH 254H or LB 220)~~ P: (CSE 331) and (STT 351 or STT 380 or STT 430 or STT 441) and (MTH 314 or MTH 317H) and (MTH 234 or MTH 254H or LB 220) 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 or in the Data Science Major.
Automated techniques used for feature extraction and pattern matching focusing on face, fingerprint and iris recognition.
Effective Fall Semester 2025

CSE 404 Introduction to Machine Learning

~~Fall of every year.~~ Fall of every year. Spring of every year. 3(3-0) Interdepartmental with Computational Mathematics, Science, & Engineering, Statistics and Probability ~~P: (CSE 331) and (STT 351 or STT 380 or STT 430 or STT 441) and MTH 314~~ P: (CSE 331) and (STT 351 or STT 380 or STT 430 or STT 441) and (MTH 314 or MTH 317H) RB: Basic linear algebra 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 or in the Data Science Major.

Core principles and techniques for machine learning including algorithms, model design, and programming.

Effective Fall Semester 2025

CSE 440 Introduction to Artificial Intelligence

~~Fall of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~P: (CSE 331) and (MTH 314 or ECE 280)~~ 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 Computer Science Major or in the Lyman Briggs Computer Science Coordinate Major or in the Lyman Briggs Computer Science Major or in the Data Science Major.

Fundamental algorithms and methods in intelligent systems and artificial intelligence.

SA: CPS 440

Effective Fall Semester 2025

CSE 471 Media Processing and Multimedia Computing

~~Spring of every year.~~ Fall of every year. 3(3-0) ~~P: (CSE 320 or CSE 331 or CSE 335) and (MTH 314 or ECE 280)~~ P: (CSE 320 or CSE 331 or CSE 335) and (MTH 314 or ECE 280 or MTH 317H) 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.

Theory and practice for manipulation of digital images, video, and audio in computer applications.

Effective Fall Semester 2025

CSE 472 Computer Graphics

Spring of every year. 3(3-0) ~~P: (CSE 331 or CSE 335) and (MTH 314 or ECE 280)~~ P: (CSE 331 or CSE 335) and (MTH 314 or ECE 280 or MTH 317H) 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.

Theory and practice for the generation of two- and three-dimensional imagery.

SA: CPS 472

Effective Fall Semester 2025

CSE 482 Big Data Analysis

~~Spring of every year.~~ Fall of every year. Spring of every year. 3(3-0) ~~P: (CSE 331 and CSE 380) and (STT 351 or STT 380 or STT 430 or STT 441) and (MTH 314 or MTH 317H) and (MTH 234 or MTH 254H or LB 220)~~ P: (CSE 331) and (STT 351 or STT 380 or STT 430 or STT 441) and (MTH 314 or MTH 317H) and (MTH 234 or MTH 254H or LB 220) and (CSE 380 or CMSE 381) 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 Data Science Major.

Principles and techniques for large-scale data analysis and applications.

Effective Fall Semester 2025

TNG 210 Manufacturing Processes and Prototyping

Fall of every year. Spring of every year. 2(0-4) ~~P: EGR 100 and (ME 280 or concurrently)~~ P: EGR 100 R: Open to students in the Technology Engineering Major.

Large and small scale conventional and additive manufacturing processes as well as electronics and chip manufacturing. Laboratory provides hands-on experiences with machine shop tools selection, use, and safe operation.

Effective Fall Semester 2025

TNG 220 Electrical Circuits
Fall of every year. Spring of every year. 4(3-2) ~~P: PHY 232 and PHY 252 and MTH 132~~ P: PHY 232 and MTH 132 R: Open to students in the Technology Engineering Major. Not open to students with credit in ECE 201.
Applications and theory of circuits and circuit design including common standard electrical components. Laboratory provides hands-on study of both AC and DC circuits.
Effective Fall Semester 2025

TNG 290 Independent Study in Technology Engineering
Fall of every year. Spring of every year. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open to freshmen or sophomores in the Technology Engineering Major. Approval of department.
NEW Supervised individual study in an area of Technology Engineering.
Effective Fall Semester 2025

TNG 291 Selected Topics in Technology Engineering
Fall of every year. Spring of every year. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open to freshmen or sophomores in the Technology Engineering Major. Approval of department.
NEW Topics selected to supplement and enrich existing courses and lead to the development of new courses.
Effective Fall Semester 2025

TNG 310 Advanced Graphic Communications
Fall of every year. Spring of every year. 3(1-4) P: TNG 210 and ME 280 R: Open to students in the Technology Engineering Major. Not open to students with credit in ME 385.
Continuation of graphic communications including electrical schematics, geometric design and tolerancing, electrical and mechanical system design, and the integration of computer aided design, computer aided manufacturing, and computer numerical control.
Effective Spring Semester 2026

TNG 445 Troubleshooting Mechatronic Systems
Spring of every year. 4(2-4) P: TNG 440 R: Open to students in the Technology Engineering Major.
Concepts, devices, and common practices associated with modern industrial control systems. Emphasis is on testing the output performance of the control system and troubleshooting techniques to address common issues.
Effective Spring Semester 2026

TNG 450 Hardware Cybersecurity
Fall of every year. 3(2-2) ~~P: TNG 322 and TNG 350~~ P: TNG 322 and TNG 355 R: Open to students in the Technology Engineering Major.
Reverse engineering process and how to methodically learn about a system from the ground up. Techniques for observing system components, measuring internal traces, and dumping important system resources and defense techniques.
Effective Fall Semester 2025

TNG 455 Engineering Secure Hardware and Software
Spring of every year. 4(2-4) P: TNG 355 and TNG 450
Projects centered on the design of a resilient system, defining the attack surface area, and fortifying against potential attacks. Forensic analyses of hardware and software systems.
Effective Spring Semester 2026

TNG 480 Technology Engineering Capstone (W)
Fall of every year. Spring of every year. 3(1-4) P: (TNG 430) and completion of Tier I writing requirement R: Open to students in the Technology Engineering Major.
Planning and execution of a team project involving the development of an engineered product or system, utilizing knowledge and skills acquired in prior engineering coursework. Project considerations include engineering standards, system constraints, design for customer needs, ethical issues, budget, timing, and safety.
Effective Spring Semester 2026

TNG 490 Independent Study in Technology Engineering
Fall of every year. Spring of every year. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open to juniors or seniors in the Technology Engineering Major. Approval of department.
NEW Supervised individual study in an area of Technology Engineering
Effective Fall Semester 2025

TNG 491 Selected Topics in Technology Engineering
Fall of every year. Spring of every year. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open to juniors or seniors in the Technology Engineering Major. Approval of department.
NEW Topics selected to supplement and enrich existing courses and lead to the development of new courses.
Effective Fall Semester 2025

COLLEGE OF HUMAN MEDICINE

FM 641 ~~Family Medicine Clerkship in the Late Clinical Experience~~ Family Medicine Clerkship
Fall of every year. Spring of every year. Summer of every year. ~~6 credits.~~ 6 to 9 credits. ~~P: HM 556~~ P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.
Clinical experience in which students take primary responsibility for managing the care of patients in a primary care setting under the supervision of attending physicians.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

HM 544 Medical School III
Summer of every year. ~~16(16-0)~~ 10(10-0) ~~A student may earn a maximum of 32 credits in all enrollments for this course.~~ A student may earn a maximum of 20 credits in all enrollments for this course. RB: Degree in DDS or DMD R: Open to graduate-professional students in the College of Human Medicine.
~~The beginning of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development. Includes history and physical exam basics.~~ The beginning of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development. Includes history and physical exam basics as well as clinical and human organ system/topic rotations.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer Semester 2026

HM 549 ~~Medical School V~~ Integrated Topics in Human Medicine
Spring of every year. ~~10(10-0)~~ 9(9-0) ~~A student may earn a maximum of 20 credits in all enrollments for this course.~~ A student may earn a maximum of 18 credits in all enrollments for this course. ~~P: HM 555~~ P: HM 563 RB: Degree in DDS or DMD R: Open to graduate-professional students in the College of Human Medicine.

~~Continuation of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development.~~ Human organ system/topic rotations integrating necessary biomedical and social sciences and humanities with clinical skills and professional development. Includes clinical rotations.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

HM 552 Medical School I
Fall of every year. ~~16 credits.~~ 16(16-0) A student may earn a maximum of 32 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Human Medicine.

~~A first course in a primary care, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development.~~ Foundational course integrating biomedical and social sciences and humanities with clinical skills and professional development.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2025

HM 553 Medical School II
Spring of every year. ~~16 credits.~~ 13(13-0) ~~A student may earn a maximum of 32 credits in all enrollments for this course.~~ A student may earn a maximum of 26 credits in all enrollments for this course. P: HM 552 R: Open to graduate-professional students in the College of Human Medicine.

~~Continuation of a primary care, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development. Includes selectives to develop areas of strength and remediate gaps.~~ Primary care clinical experience with integrated development of biomedical and social science knowledge. Scholarly project.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2026

HM 562 Medical School III
Summer of every year. 13(13-0) A student may earn a maximum of 26 credits in all enrollments for this course. P: HM 553 R: Open to graduate-professional students in the College of Human Medicine.

NEW The beginning of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development, with clinical rotations.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer Semester 2026

HM 563 Medical School IV
Fall of every year. 13(13-0) A student may earn a maximum of 26 credits in all enrollments for this course. P: HM 562 R: Open to graduate-professional students in the College of Human Medicine.
NEW The continuation of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development, with clinical rotations.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2026

HM 564 Integrated Topics in Human Medicine
Spring of every year. 6(6-0) A student may earn a maximum of 12 credits in all enrollments for this course. P: HM 563 R: Open to graduate-professional students in the College of Human Medicine.
NEW Human organ system/topic rotations integrating necessary biomedical and social sciences and humanities with clinical skills and professional development.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

HM 565 Integrated Medical School III
Summer of every year. 16(16-0) A student may earn a maximum of 32 credits in all enrollments for this course. P: HM 553 R: Open to graduate-professional students in the College of Human Medicine.
NEW The beginning of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development. Incorporates clinical and human organ system/topic rotations.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer Semester 2026

HM 566 Integrated Medical School IV
Fall of every year. 16(16-0) A student may earn a maximum of 32 credits in all enrollments for this course. P: HM 565 R: Open to graduate-professional students in the College of Human Medicine.
NEW The continuation of an interdisciplinary, patient centered experience, integrating necessary biomedical and social sciences and humanities with clinical skills and professional development. Incorporates clinical and human organ system/topic rotations.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2026

HM 603 Transition to Clerkships
Spring of every year. Summer of every year. 1 credit. P: HM 549 or HM 563 or HM 565 R: Open to graduate-professional students in the College of Human Medicine.
NEW Core knowledge and skills for the medical student entering the clinical clerkship years.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

HM 634 Indigenous Community Health
Fall of every year. Spring of every year. Summer of every year. 3 to 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. P: HM 556 R: Approval of college.

NEW Patient centered and community-based experience in Indigenous medicine.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Spring Semester 2023

HM 648 Care of Migrant & Seasonal Agricultural Workers Elective
Fall of every year. Spring of every year. Summer of every year. 3 to 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. P: FM 641 or MED 641 or OGR 641 or PHD 641 or PSC 641 or SUR 641 R: Approval of college.

NEW Mobile health experience addressing health disparities faced by migrant and seasonal agricultural workers. Proficiency in medical Spanish is a requirement.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Fall Semester 2024

HM 651 Advanced Skills and Knowledge in Medical School I
~~Fall of every year.~~ Fall of every year. Summer of every year. 3(3-0) ~~A student may earn a maximum of 20 credits in all enrollments for this course.~~ A student may earn a maximum of 6 credits in all enrollments for this course. ~~P: HM 556~~ P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.

~~Interdisciplinary small group course for advanced medical students combining advanced clinical skills, ongoing development of research skills, and principles of biomedical science and humanities.~~ Interdisciplinary course for advanced medical students combining advanced clinical skills, ongoing development of research skills, and principles of biomedical science and humanities.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Summer Semester 2027

HM 652 Advanced Skills and Knowledge in Medical School II
~~Spring of every year.~~ Fall of every year. Spring of every year. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. P: HM 651 R: Open to graduate-professional students in the College of Human Medicine.

~~Interdisciplinary small group course for advanced medical students combining advanced clinical skills, ongoing development of research skills, and principles of biomedical science and humanities.~~ Interdisciplinary course for advanced medical students combining advanced clinical skills, ongoing development of research skills, and principles of biomedical science and humanities.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2027

HM 673 Transition to Residency
Fall of every year. Spring of every year. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: HM 652 and FM 641 and PHD 641 and MED 641 and PSC 641 and OGR 641 and SUR 651 R: Open to graduate-professional students in the College of Human Medicine.

NEW
Practice of skills and knowledge application to the activities of a resident, including common day to day patient care activities and responding to emergencies.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2028

MED 641 ~~Internal Medicine Clerkship in the Late Clinical Experience~~ Internal Medicine Clerkship
Fall of every year. Spring of every year. Summer of every year. 6 to 9 credits. ~~P: HM 556~~ P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.

Clinical experience in which students take primary responsibility for managing the care of adult patients under the supervision of senior residents and/or attending physicians
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

OGR 641 ~~Obstetrics and Gynecology Clerkship in the Late Clinical Experience~~
Obstetrics and Gynecology Clerkship
Fall of every year. Spring of every year. Summer of every year. ~~6 credits.~~ 6 to 9 credits. ~~P: HM 556~~ P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.

Diagnosis and management of common patient problems in obstetrics and gynecology.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

PHD 641 ~~Pediatric Clerkship in the Late Clinical Experience~~ Pediatric Clerkship
Fall of every year. Spring of every year. Summer of every year. ~~6 credits.~~ 6 to 9 credits. ~~P: HM 556~~ P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.

Clinical experience in which students take primary responsibility for managing the care of pediatric patients under the supervision of senior residents and/or attending physicians.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

PSC 641 ~~Psychiatry and Behavioral Science Clerkship in the Late Clinical Experience~~
Psychiatry and Behavioral Science Clerkship
Fall of every year. Spring of every year. Summer of every year. 6 credits. ~~P: HM 556~~ P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.
Supervised practice with in-patient, out-patient, emergency, and community mental health services.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

ANTR 354L Human Gross Anatomy Model Laboratory
Fall of every year. Spring of every year. 1(0-2) P: ANTR 350 or concurrently
NEW An introductory, structured survey of human, regional gross anatomy using anatomical models, medical imaging, and multimedia for students in allied medical fields. Usage and pronunciation of medical terminology.
Effective Fall Semester 2025

SUR 643 Surgical Critical Care
Fall of every year. Spring of every year. Summer of every year. 6 credits. ~~P: SUR 641 and SUR 642~~ P: SUR 642 or SUR 651 R: Open to graduate-professional students in the College of Human Medicine.
Hospital-based clinical experience in evaluating and managing acutely ill surgical patients.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2028

SUR 651 Surgery Clerkship
Fall of every year. Spring of every year. Summer of every year. 9 credits. P: HM 549 or HM 556 or HM 564 or HM 566 R: Open to graduate-professional students in the College of Human Medicine.
NEW Diagnosis and management of common patient problems in the general surgical and trauma setting.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Spring Semester 2027

COLLEGE OF NATURAL SCIENCE

BS 200 Biological Sciences Fellows Directed Studies
Fall of every year. Spring of every year. 2(2-0) A student may earn a maximum of 8 credits in all enrollments for this course. RB: Recommended for students who have taken or are enrolled in BS161, BS171, BS162, BS172, BS181H, BS191H, BS182H, and/or BS192H. R: Approval of department.
Students provide their own voice, reflect on their experiences, and explore scholarly work in biology and STEM education to develop and implement a collaborative project that improves student experiences and success in STEM and BioSci.
Effective Fall Semester 2025

BLD 838 Clinical Context of Blood Product Management
~~Fall of even years.~~ Spring of odd years. 1(1-0) RB: Experience in transfusion medicine
Effective blood product management in the context of high use, high demand clinical settings.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 3 semesters after the end of the semester of enrollment.
Effective Spring Semester 2025

CEM 142 General and Inorganic Chemistry
Fall of every year. Spring of every year. Summer of every year. ~~3(4-0)~~ 4(4-0) P: CEM 141 or CEM 151 or CEM 181H or LB 171 Not open to students with credit in CEM 182H or CEM 152 or LB 172.
~~Kinetics; gaseous equilibria; acids and bases; pH; buffers; hydrolysis; titrations; heterogeneous equilibria; thermodynamics; redox and electrochemistry; transition metal chemistry; nuclear chemistry; main group chemistry.~~ Thermodynamics; solutions; kinetics; gaseous equilibria; acids and bases; pH; buffers; hydrolysis; titrations; aqueous equilibria; redox
Effective Fall Semester 2025

CEM 152 Principles of Chemistry
Spring of every year. ~~3(4-0)~~ 4(4-0) P: CEM 151 or CEM 181H or LB 171 Not open to students with credit in CEM 182H or LB 172.
Gases, liquids, and solids; thermodynamics; changes of state; solutions and colligative properties; chemical equilibria; acids, bases, and aqueous equilibria; kinetics; redox reactions and electrochemistry; nuclear chemistry.
Effective Fall Semester 2025

CEM 251 Organic Chemistry I
Fall of every year. Spring of every year. Summer of every year. ~~3(4-0)~~ 4(4-0) P: CEM 141 or CEM 151 or CEM 181H or LB 171 RB: CEM 142 or CEM 152 or CEM 182H or LB 172 Not open to students with credit in CEM 351.
Common classes of organic compounds including their nomenclature, structure, bonding, reactivity, and spectroscopic characterization.
Effective Fall Semester 2025

CEM 252 Organic Chemistry II
Fall of every year. Spring of every year. Summer of every year. ~~3(4-0)~~ 4(4-0) P: CEM 251 or LB 271 Not open to students with credit in CEM 352.
Continuation of CEM 251 with emphasis on polyfunctional compounds, particularly those of biological interest.
Effective Fall Semester 2025

CEM 351 Organic Chemistry I
Fall of every year. ~~3(4-0)~~ 4(4-0) P: CEM 152 or CEM 182H or CEM 142 or LB 172
Structure, bonding, and reactivity of organic molecules.
Effective Fall Semester 2025

CEM 352 Organic Chemistry II
Spring of every year. ~~3(4-0)~~ 4(4-0) P: CEM 351
Carboxylate derivatives. Conjugation. Aromaticity. Amino acids. Proteins. Carbohydrates. Nucleic acids.
Effective Fall Semester 2025

GLG 330 Biogeochemistry
Spring of every year. 3(3-0) P: CEM 141 RB: (GLG 200 or GLG 201 or GEO 206 or IBIO 355) and CEM 161

NEW

Physical, chemical, and biological processes that govern the flow of chemical elements. How humans have altered the movement of these chemical elements through the environment. Biogeochemical cycling of elements between the hydrosphere, lithosphere, atmosphere, and biosphere across time and space.
Effective Spring Semester 2025

GLG 440 Planetary Geology
Spring of every year. 3(2-2) P: GLG 201 and GLG 304 and GLG 321 or approval of department RB: (PHY 232 or PHY 184 or PHY 294H or LB 274) and (MTH 132 or MTH 152H or LB 118)

Surficial and internal properties and processes of planets and their natural satellites, asteroids, comets, and meteorites. Origin, composition, structure, tectonics, volcanism, impact phenomena, atmospheric evolution, atmosphere-surface interactions, and history of solar system bodies. Results of recent space exploration programs, projects and missions.
DELETE COURSE
Effective Fall Semester 2025

GLG 470 Solid Earth Geophysics and Geodynamics
~~Spring of odd years.~~ Spring of even years. 3(3-0) ~~P: (GLG 201) and (MTH 133 or LB 119 or MTH 153H or MTH 126) and (PHY 183 or PHY 183B or PHY 193H or PHY 233B or LB 273 or PHY 173 or PHY 221 or PHY 241 or PHY 231 or PHY 231C)~~ P: (GLG 201) and (MTH 133 or LB 119 or MTH 153H or MTH 126) and (PHY 183 or PHY 231 or PHY 193H or LB 273 or PHY 221) ~~RB: (MTH 234 or concurrently) or (LB 220 or concurrently) or (MTH 254H or concurrently)~~

Theory and applications of solid-earth geophysics including geochronology, geothermics, geomagnetism and paleomagnetism, geodesy and gravity, rheology, and seismology.
SA: GLG 472
Effective Spring Semester 2026

IBIO 150 Integrating Biology: From DNA to Populations
Fall of every year. Spring of every year. 3(3-0) ~~P: ((MTH 103 or concurrently) or (MTH 110 or concurrently) or (MTH 112 or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (LB 118 or concurrently) or (MTH 201 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test~~ P: ((MTH 103 or concurrently) or (MTH 116 or concurrently) or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (LB 118 or concurrently) or (MTH 201 or concurrently) or (STT 200 or concurrently) or (STT 201 or concurrently)) or designated score on Mathematics Placement test R: Not open to undergraduate students in the Department of Integrative Biology.

Examine biological systems across multiple levels of organization - spatial, temporal, taxonomic - using evolutionary biology as the common thread.
Effective Spring Semester 2025

MTH 202 Elementary Mathematics for Teachers II
Fall of every year. Spring of every year. 3(3-0) P: MTH 201 R: Open to students in the Education Major or in the Special Education-Learning Disabilities Major or in the Child Development major or in the Teacher Certification Internship Year Studies Program.

A continuation of MTH 201. Measurement, elementary geometry, and elementary number theory with an emphasis on children’s mathematical thinking.
DELETE COURSE
Effective Fall Semester 2025

MTH 301 Foundations of Higher Mathematics
Fall of every year. Spring of every year. 3(3-0) P: (MTH 133 or MTH 153H or LB 119) and MTH 202 R: Open to students in the Mathematics Elementary Teaching Major or in Mathematics-Elementary Disciplinary Teaching Minor or approval of department.
Elementary set theory including permutations, combinations, cardinality theorems, relations, functions and quotient sets. Basic principles of logic and proof techniques. Elementary number theory and abstract algebra.
DELETE COURSE
Effective Fall Semester 2025

HBIO 300 Special Topics in Human Biology
Fall of every year. Spring of every year. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course. P: HBIO 295 R: Open to sophomores or juniors or seniors in the Human Biology Major. A student may earn a maximum of 4 credits
NEW Exploration of contemporary and emerging issues in biomedical and health sciences.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 1 semester after the end of the semester of enrollment.
Effective Fall Semester 2025

AST 304 Stars
~~Fall of even years.~~ Fall of every year. 3(3-0) ~~P: AST 208 and (PHY 215 or PHY 215B) and (PHY 321 or concurrently)~~ P: (AST 208) and PHY 215 and (PHY 321 or concurrently) RB: AST 208
Physical processes that determine the structure and evolution of stars. Observations of stars and star clusters. Spectra of stars.
Effective Fall Semester 2025

COLLEGE OF OSTEOPATHIC MEDICINE

IM 618 ~~Clinical Tropical Medicine~~ Global Health: Clinical Fundamentals
Fall of every year. 2(2-0) R: Open to osteopathic medicine students or approval of college.
Selected topics such as African AIDS, malaria, onchocerciasis, tuberculosis, and schistosomiasis. Pathophysiology, treatments, epidemiology, current research, and controversies.
Request the use of the Pass-No Grade (P-N) system.
~~SA: CMS 618~~
Effective Fall Semester 2024

IM 621 ~~Clinical Tropical Medicine Clerkship~~ Global Health: Elective Clerkship in Malawi
Spring of every year. ~~1 to 20 credits.~~ 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. P: IM 618 RB: IM 618 ~~R: Open to graduate-professional students in the College of Osteopathic Medicine.~~ R: Open to osteopathic medicine students in the College of Osteopathic Medicine. Approval of college.
Supervised clinical experiences in a large African teaching hospital and its outpatient clinics; students must spend at least six weeks on site. Small group discussions led by MSU faculty.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
~~SA: CMS 621~~
Effective Spring Semester 2025

OST 521 Musculoskeletal System
Fall of every year. 4(8-2) P: OST 520 R: Open to graduate-professional students in the College of Osteopathic Medicine.
Structure, function, and conditions of the musculoskeletal system as applied to osteopathic medicine.
Request the use of the Pass-No Grade (P-N) system.
Effective Fall Semester 2025

OST 522 Hematology, Oncology and Infectious Diseases
Fall of every year. 3(3-0) P: OST 520 R: Open to graduate-professional students in the College of Osteopathic Medicine.
Systems biology approach to principles of hematology, oncology, and response to infection.
Request the use of the Pass-No Grade (P-N) system.
Effective Fall Semester 2025

OST 587 Directed Study in Human Prosection
Fall of every year. Spring of every year. Summer of every year. 1 to 15 credits. A student may earn a maximum of 15 credits in all enrollments for this course. P: OST 510 or approval of college R: Open to graduate-professional students in the College of Osteopathic Medicine.
NEW Prosection of selected regions and isolated structures of preserved human cadavers. Oral presentation.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 588 Independent Study in Clinical Human Morphology
Fall of every year. Spring of every year. Summer of every year. 1 to 15 credits. A student may earn a maximum of 15 credits in all enrollments for this course. P: OST 510 R: Open to graduate-professional students in the College of Osteopathic Medicine.
NEW Independent study of a specific topic from gross anatomy, histology, radiological anatomy, cytology, neuroscience, or embryology.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 630 Psychiatry & Behavioral Science Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine.
NEW Supervised practice with in-patient, out-patient, emergency, and community mental health services.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 631 Adult Psychiatry Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in PSC 609.

NEW Experience in psychiatry in clinical settings with adults.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 632 Child Psychiatry Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in PSC 610.

NEW Experience in psychiatry in clinical settings with child patients and their families.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 633 Addiction Psychiatry Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. RB: OST 630 R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in PSC 611.

NEW Knowledge and skills in psychopathology, psychiatric diagnosis, psychiatric therapies and prevention with addiction patients and their families.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 634 Geriatric Psychiatry Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. RB: OST 630 R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in PSC 612.

NEW Knowledge and skills in psychopathology, psychiatric diagnosis, psychiatric therapies and prevention of psychiatric illness with geriatric patients and their families.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 640 Radiology Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in RAD 609.

NEW Diagnostic imaging consultation. Participation in image interpretation and observation in hospital or out-patient radiology setting. Radiological procedure guideline and patient safety and comfort. Complications of radiological procedures.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 641 Interventional Radiology
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in RAD 612.

NEW Fundamentals of radiation biology, diagnostic and therapeutic techniques, safety, and follow-up of interventional radiology procedures.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 670 Directed Study in Clinical Prosection
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. P: OST 510 R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in ANTR 685.

NEW Anatomical prosection and body-region specific pathologies.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

OST 671 Pathology Clerkship
Fall of every year. Spring of every year. Summer of every year. 1.5 to 30 credits. A student may earn a maximum of 30 credits in all enrollments for this course. R: Open to graduate-professional students in the College of Osteopathic Medicine. Not open to students with credit in HM 610.

NEW Anatomic and clinical pathology with emphasis on clinical-pathological correlation. Conducted in pathology departments of affiliated hospitals.
Request the use of the Pass-No Grade (P-N) system.
Request the use of ET-Extension to postpone grading.
The work for the course must be completed and the final grade reported within 2 semesters after the end of the semester of enrollment.
Effective Summer Semester 2025

COLLEGE OF VETERINARY MEDICINE

VM 120 Veterinary Comparative Nutrition
Spring of every year. 2(2-0) P: VM 250 R: Approval of college.
Energy metabolism, nutrients and nutrient requirements of common domestic species.
Effective Fall Semester 2025

VM 140 Pharmacology for Veterinary Nurses
Fall of every year. ~~2(2-0)~~ 3(3-0) ~~P: {(MTH 101 and MTH 103) or MTH 103} and (MTH 114 or MTH 116 or MTH 124 or MTH 132 or MTH 152H)~~ P: {(MTH 103B or MTH 103 or MTH 116 or MTH 124 or LB 118) or MTH 103} and (MTH 114 or MTH 116 or MTH 124 or MTH 132 or MTH 152H) R: Approval of college.
Fundamentals of characteristics, classification and usage of veterinary pharmaceuticals. Introduction to and application of dosage and formulation calculations.
Effective Fall Semester 2025

VM 210 Surgical Nursing for Veterinary Nurses
Fall of every year. ~~2(1-1)~~ 3(3-0) P: VM 160 and VM 130 and VM 250 R: Approval of department. ~~C: VM 215 concurrently and VM 303 concurrently~~ C: VM 215 concurrently and VM 303 concurrently
Role of the veterinary nurse as a member of the veterinary surgical team.
Effective Fall Semester 2025

VM 303 Anesthesiology for Veterinary Nurses
Fall of every year. ~~2(1-1)~~ 3(3-0) P: VM 140 and VM 160 and VM 130 and VM 250 R: Approval of college. ~~C: VM 215 concurrently and VM 210 concurrently~~ C: VM 215 concurrently and VM 210 concurrently

Pharmacologic action of preanesthetic and anesthetic drugs. Principles and techniques of induction, maintenance, monitoring, and recovery of the patient. Humane methods of euthanasia.
Effective Fall Semester 2025