ADDENDA TO THIS CATALOG

The Undergraduate Catalog is published each academic year in June prior to the fall semester. The provisions of the Undergraduate Catalog are not to be regarded as a contract between the student and the University of Maryland. The university reserves the right to change its policies, rules, regulations, requirements for graduation, course offerings, tuition, fees, other charges, or any other contents of this catalog at any time.

When necessary, the university will track changes to the Undergraduate Catalog in this addenda section:

• For addenda related to policies, rules, regulations, tuition, fees and general information, see General Addenda
• For addenda related to curricula (i.e., descriptions, learning outcomes, and requirements for majors, minors, and certificates), see Curriculum Addenda

Note: Updates to course offerings (e.g., course description changes), will be reflected in the following year’s catalog and are not tracked in this addenda section.

GENERAL ADDENDA

This section contains addenda related to policies, rules, regulations, tuition, fees and general information. Each addendum contains an excerpt from the catalog as it was originally published as well as the change that was made. To view the full original text, see the catalog page referenced in the addendum.

Division of University Relations

Under Division of University Relations (https://academiccatalog.umd.edu/about-university/campus-administration-deans/university-relations/)

1. The office location was updated and an Interim Vice President was appointed (published September 13, 2023).
2. The Interim Vice President for University Relations was appointed as Vice President for University Relations (published November 15, 2023).

Original
(1) 1132 Thomas V. Miller, Jr. Administration Building
Phone: 301-405-4680
http://urhome.umd.edu (http://urhome.umd.edu/)
Vice President: Matthew Hodge

Change
(1) 0132 Thomas V. Miller, Jr. Administration Building
Phone: 301-405-4680
http://urhome.umd.edu (http://urhome.umd.edu/)
Vice President: Matthew Hodge (through July 13, 2023)
Interim Vice President: James F. Harris (effective July 14, 2023)

(2) Vice President: James F. Harris (effective November 6, 2023)

University Administration and Deans

Under University Administration and Deans (https://academiccatalog.umd.edu/about-university/campus-administration-deans/)

1. An Interim Vice President for University Relations was appointed (published September 13, 2023).
2. The Interim Vice President for University Relations was appointed as Vice President for University Relations (published November 15, 2023).

Original
(1) Vice President for University Relations Matthew Hodge, Ph.D.

Change
(1) Vice President for University Relations Matthew Hodge, Ph.D. (through July 13, 2023)
Interim Vice President for University Relations James F. Harris (effective July 14, 2023)

(2) Vice President for University Relations James F. Harris (effective November 6, 2023)

University Career Center & The President’s Promise

Under University Career Center & The President’s Promise (UCC/TPP) (https://academiccatalog.umd.edu/undergraduate/campus-administration-resources/student-services/student-programs/services/university-career-center-presidents-promise/)

• The College of Information Studies was added to “A Network of Support” (published September 5, 2023).
• Handshake, Vault, and Big Interview replaced Careers4Terps, FirstHand, and InterviewStream in the “Careers4Terps & Other Online Resources” (published September 5, 2023).

Original
A NETWORK OF SUPPORT
Located in the South Wing of Hornbake Library, the Center serves as a campus hub of career-related activities. We also distribute staff to locations in the following schools and colleges:

• College of Agriculture and Natural Resources (https://agnr.umd.edu/student-opportunities/internships-careers/)
• College of Arts and Humanities (https://arhu.umd.edu/careers/)
• College of Behavioral and Social Sciences, Feller Center for Advising & Career Planning (https://fellercenter.umd.edu/)
• College of Computer, Mathematical and Natural Sciences (https://cmns.umd.edu/undergraduate/research-internships/careerservices/)
• School of Public Health (https://sphealth.umd.edu/content/university-career-center-sph/)
• The Graduate School (https://gradschool.umd.edu/professionaldevelopment/)

Distributed staff provide advising and programming that targets industries and professional fields related to majors in their respective host school or college. Students may access resources, services, and programs based on their career interests and immediate needs.

The Center partners with other campus career operations, including:

• Robert H. Smith School of Business Career Services (https://rhsmith.umd.edu/office-career-services/)
• A. James Clark School of Engineering Career Services (https://eng.umd.edu/careers/)
• School of Public Policy Career Services (https://spp.umd.edu/career-connections/)
CAREERS4TERPS & OTHER ONLINE RESOURCES
Update your Careers4Terps (C4T) (https://careers.umd.edu/careers4terps) profiles to manage your career. C4T is the Center's online career management database and your gateway to:

- Applying to 1,000+ internships, part-time job, and full-time job postings
- Scheduling career advising appointments and signing up for workshops, panels, and employer programs
- Accessing virtual resources: Focus2 (self-assessment), FirstHand (industry guides), InterviewStream (virtual interviewing practice), and more.

Change
A NETWORK OF SUPPORT
Located in the South Wing of Hornbake Library, the Center serves as a campus hub of career-related activities. We also distribute staff to locations in the following schools and colleges:

- College of Agriculture and Natural Resources (https://agnr.umd.edu/student-opportunities/internships-careers/)
- College of Arts and Humanities (https://ahru.umd.edu/careers/)
- College of Behavioral and Social Sciences, Feller Center for Advising & Career Planning (https://fellercenter.umd.edu/)
- College of Computer, Mathematical and Natural Sciences (https://cmn.umd.edu/undergraduate/research-internships/career-services/)
- College of Information Studies (http://ischool.umd.edu/academics/career-resources/)
- School of Public Health (https://sp.umd.edu/content/university-center-sph/)
- The Graduate School (https://gradschool.umd.edu/professionaldevelopment/)

Distributed staff provide advising and programming that targets industries and professional fields related to majors in their respective host school or college. Students may access resources, services, and programs based on their career interests and immediate needs.

The Center partners with other campus career operations, including:

- Robert H. Smith School of Business Career Services (https://rhsmith.umd.edu/office-career-services/)
- A. James Clark School of Engineering Career Services (https://eng.umd.edu/careers/)
- School of Public Policy Career Services (https://sp.umd.edu/career-connections/)

HANDSHAKE & OTHER ONLINE RESOURCES
Update your Handshake (https://careers.umd.edu/handshake) profile to manage your career. Handshake is the Center's online career management database and your gateway to:

- Applying to 1,000+ internships, part-time job, and full-time job postings
- Scheduling career advising appointments and signing up for workshops, panels, and employer programs
- Accessing virtual resources: Focus2 (self-assessment), Vault (industry guides), Big Interview (virtual interviewing practice), and more.

CURRICULUM ADDENDA
This section contains a list of addenda related to undergraduate program changes. Each listing has a summary of the modifications (i.e., changes to descriptions, learning outcomes, and requirements for majors, minors, and certificates) or indicates if the program is new. To view a program's addendum in full detail, please visit the program's catalog page as referenced in the summary below.

- Aerospace Engineering Major (p. 2)
- Animal Sciences Major (p. 3)
- Astronomy Major (p. 5)
- Biochemistry Major (p. 6)
- Bioengineering Major (p. 7)
- Chemical Engineering Major (p. 7)
- Civil Engineering Major (p. 7)
- Communication Major (p. 7)
- Computational Finance Minor (p. 11)
- Computer Engineering Major (p. 7)
- Cyber-Physical Systems Engineering Major (p. 12)
- Economics Major (p. 12)
- Electrical Engineering Major (p. 13)
- Environmental Science and Technology Major (p. 14)
- Fire Protection Engineering Major (p. 16)
- French Language and Literature Major (p. 17)
- Global Terrorism Studies Minor (p. 17)
- Kinesiology: Biomechanics and Motor Control Minor (p. 18)
- Kinesiology: Exercise Physiology Minor (p. 19)
- Kinesiology: Sport, Commerce, & Culture Minor (p. 19)
- Information Science Major (p. 20)
- Information Science Major at Shady Grove (p. 20)
- Materials Science and Engineering Major (p. 21)
- Mechanical Engineering Major (p. 21)
- The Robert H. Smith School of Business (p. 21)
- Robotics and Autonomous Systems Minor (p. 22)
- Technology and Information Design Major (p. 23)

Aerospace Engineering Major
Under Aerospace Engineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/aerospace-engineering/aerospace-engineering-major/)

- The accreditation statement in the program description changed (published September 7, 2023).

Original
The Bachelor of Science in Aerospace Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Aerospace Engineering Program Criteria.

Change
The Bachelor of Science in Aerospace Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria.
Animal Sciences Major

Under Animal Sciences Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/agriculture-natural-resources/animal-sciences/animal-sciences-major/)

- Effective Spring 2024, the program description, learning outcomes, and course requirements changed (published December 19, 2023).

Original
See Animal Sciences Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/agriculture-natural-resources/animal-sciences/animal-sciences-major/).

Change
The Department of Animal and Avian Sciences provides a challenging program for academically talented students interested in the application of biology and technology to the care, management and study of domestic and aquatic animals. In addition to emphasizing the traditional farm species of dairy and beef cattle, sheep, swine and poultry, our program includes options for courses in equine science, animal biotechnology, and sciences which prepare students for veterinary or graduate school. Animal sciences majors explore a wide range of subjects - from fundamental biology to animal nutrition, physiology and genetics - while integrating science and economics into animal management. Courses offered by this department may be found under the following acronym: ANSC.

Our department offers B.S., M.S., and Ph.D. degrees. Many students in our Science/Pre-Professional option choose to continue their education in a variety of professional schools, ranging from veterinary school and MS/PhD graduate programs to things like human medical school or higher education. Our graduates also pursue industry and hands-on careers, such as research technicians, animal care specialists, sales or marketing representatives, and animal producers.

Program Learning Outcomes
Graduates of the ANSC undergraduate program will be able to:

1. Animal husbandry requirements- Graduates of the ANSC undergraduate program will be able to apply animal science knowledge and research to the creation of rational, feasible, and legal animal management programs that take into consideration appropriate nutrition, husbandry, health, reproduction, and welfare considerations.

2. Safely handle animals- Graduates of the ANSC undergraduate program will be able to safely approach, restrain, and move horses, sheep, dairy cows, pigs, chickens and other species specific to their curricula.

3. Animal Science literacy- Graduates of the ANSC undergraduate program will be able to select, understand, and critically evaluate scientific studies in animal sciences disciplines such that they employ research that is applicable, timely, accurate, and useful for their animal care and management needs.

4. Knowledge of major issues in ANSC- Graduates of the animal sciences program will be well-versed in the issues related to animal agriculture such that they contribute to societal debates around the future of farming, the use of antibiotics in animal agriculture, sustainability of our animal farms, animal welfare, farm worker needs, and scaling agricultural enterprises up and down to meet our growing population's protein needs.

5. Careers and opportunities in ANSC- Graduates of the ANSC undergraduate program will be able to describe at least five career options available to them with the knowledge, skills, and experience they receive as undergraduates and identify specific job opportunities that match their abilities, experience, and interests.

6. Animal structure and function- Graduates of the ANSC undergraduate program will be able to correctly apply their knowledge of anatomy and physiology of domestic animals to explain normal homeostatic functioning of program-specific domestic species at the organismal, tissue, cellular, and molecular levels. Students will be able to adapt that knowledge to address abnormalities in at least one body system.

7. Communication- Graduates of the ANSC program will be able to communicate effectively with the public, producers, and the scientific community through oral, written, and visual means in print and on-line.

Requirements
Animal Sciences prepares students for veterinary school, graduate school, and careers in research, sales and marketing, biotechnology, aquaculture, and animal production. The curricula apply the principles of biology and technology to the care, management, and study of dairy and beef cattle, horses, fish, sheep, swine, and poultry. Students complete the Animal Sciences core courses and choose between two broad tracks: Animal Care and Management, for students interested in going directly into a career, or Sciences/Professional Option to prepare for admission to graduate, veterinary, pharmacy, nursing or medical school. Students can customize their program based on their area of interest (emphasis area) by selecting courses from that area to fulfill major requirements.

Please note: there is a $50 per course fee for Animal Science Laboratory courses.

All undergraduates majoring in Animal Sciences must complete the following course requirements:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC101</td>
<td>Principles of Animal Science</td>
<td>4</td>
</tr>
<tr>
<td>&amp; ANSC103</td>
<td>and Principles of Animal Science Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ANSC204</td>
<td>Anatomy of Domestic Animals</td>
<td>4</td>
</tr>
<tr>
<td>&amp; ANSC205</td>
<td>and Anatomy of Domestic Animals Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ANSC212</td>
<td>Applied Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; ANSC214</td>
<td>and Applied Animal Physiology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ANSC314</td>
<td>Comparative Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>ANSC315</td>
<td>Applied Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>BSCI160</td>
<td>Principles of Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>&amp; BSCI161</td>
<td>and Principles of Ecology and Evolution Lab</td>
<td>4</td>
</tr>
</tbody>
</table>
### Specializations:

#### Animal Care and Management

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC327</td>
<td>Molecular and Quantitative Animal Genetics</td>
<td>3</td>
</tr>
<tr>
<td>or ANSC450</td>
<td>Animal Breeding Plans</td>
<td>4</td>
</tr>
<tr>
<td>ANSC446</td>
<td>Physiology of Mammalian Reproduction</td>
<td>4</td>
</tr>
<tr>
<td>&amp; ANSC447</td>
<td>and Physiology of Mammalian Reproduction Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>AREC306</td>
<td>Farm Management and Sustainable Food Production</td>
<td>3</td>
</tr>
<tr>
<td>or ANSC270</td>
<td>Animal Enterprise Management</td>
<td>4</td>
</tr>
<tr>
<td>or INAG204</td>
<td>Agricultural Business Management</td>
<td>4</td>
</tr>
<tr>
<td>CHEM231</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>or PLSC275</td>
<td>&amp; Organic Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>or AGST275</td>
<td>Fundamentals of Agricultural and Environmental Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>ANSC359</td>
<td>Internship Experience in Animal and Avian Sciences</td>
<td>3-6</td>
</tr>
</tbody>
</table>

#### Advanced ANSC Electives

Select 9 credits of the following:

- ANSC330 | Equine Science | 3
- ANSC340 | Health Management of Animal Populations | 3
- ANSC410 | The Gut Microbiome and its Roles in Health and Disease | 3
- ANSC417 | Regulatory Issues in Animal Care and Management | 3
- ANSC435 | Experimental Embryology | 3
- ANSC437 | Animal Biotechnology | 3
- ANSC440 | Zoonotic Diseases and Control | 3
- ANSC443 | Physiology of Lactation | 3
- ANSC444 | Domestic Animal Endocrinology | 3
- ANSC450 | Animal Breeding Plans | 3
- ANSC452 | Avian Physiology | 3
- ANSC453 | Animal Welfare and Bioethics | 3
- ANSC455 | Applied Animal Behavior | 3
- ANSC460 | Comparative Vertebrate Immunology | 3
- ANSC497 | Animal Biotechnology Recombinant DNA Laboratory | 3
- ANSC510 | The Gut Microbiome and its Roles in Health and Disease | 3
- ANSC517 | Regulatory Issues in Animal Care and Management | 3
- ANSC530 | Equine Science | 3
- ANSC539 | Internship Experience in Animal and Avian Sciences | 3
- ANSC540 | Health Management of Animal Populations | 3
- ANSC541 | The Gut Microbiome and its Roles in Health and Disease | 3
- ANSC547 | Experimental Embryology | 3
- ANSC549 | Animal Biotechnology | 3
- ANSC550 | Zoonotic Diseases and Control | 3
- ANSC553 | Physiology of Lactation | 3
- ANSC554 | Domestic Animal Endocrinology | 3
- ANSC556 | Physiology of Mammalian Reproduction | 3
- ANSC557 | Physiology of Mammalian Reproduction Laboratory | 3
- ANSC560 | Animal Breeding Plans | 3
- ANSC562 | Avian Physiology | 3
- ANSC563 | Animal Welfare and Bioethics | 3

### Science/Professional & Combined Ag-Veterinary Medicine

Select 9 credits of the following:

- ANSC220 | Livestock Management | 3
- ANSC232 | Horsemanship | 3
- ANSC237 | Equine Reproductive Management | 3
- ANSC242 | Dairy Cattle Management | 3
- ANSC245 | Sheep Management | 3
- ANSC246 | Beef Management | 3
- ANSC250 | Companion Animal Care and Management | 3
- ANSC255 | Introduction to Aquaculture | 3
- ANSC260 | Laboratory Animal Management | 3
- ANSC262 | Commercial Poultry Management | 3
- ANSC282 | Grazing Animal Management | 3

### Management Courses

Select 9 credits of the following:

- ANSC220 | Livestock Management | 3
- ANSC232 | Horsemanship | 3
- ANSC237 | Equine Reproductive Management | 3
- ANSC242 | Dairy Cattle Management | 3
- ANSC245 | Sheep Management | 3
- ANSC246 | Beef Management | 3
- ANSC250 | Companion Animal Care and Management | 3
- ANSC255 | Introduction to Aquaculture | 3
- ANSC260 | Laboratory Animal Management | 3
- ANSC262 | Commercial Poultry Management | 3
- ANSC282 | Grazing Animal Management | 3
Management Courses
Select 3 credits of the following:  
- ANSC220 Livestock Management
- ANSC232 Horse Management
- ANSC237 Equine Reproductive Management
- ANSC242 Dairy Cattle Management
- ANSC245 Sheep Management
- ANSC246 Beef Management
- ANSC250 Companion Animal Care and Management
- ANSC255 Introduction to Aquaculture
- ANSC260 Laboratory Animal Management
- ANSC262 Commercial Poultry Management
- ANSC282 Grazing Animal Management

Total Credits 38-39

*A complete listing of all currently approved Management and Advanced ANSC Elective courses is available from our ANSC Course Listing [link].

Other Requirements for the Major
Animal sciences majors select one of two options to guide their coursework. Program requirements [link] for all options are available on our website, along with a list of all ANSC courses [link] and when they are offered.

Animal Care & Management (0104A) - Is designed for students whose career plans include animal management, production and the marketing of animal products. The curriculum provides basic courses in genetics, nutrition, physiology and reproduction while allowing students to focus on the management of one particular livestock species. You are required to supplement academic work with practical experience by completing an internship. Dairy science students, for example, intern at local farms where they participate in decisions about breeding, feeding, health practices, milk production and other aspects of herd management. This option will prepare you for ownership or management positions with dairy, livestock or poultry production enterprises; positions with marketing and processing organizations; breed associations; and positions in agribusiness fields such as sales of feed, pharmaceutical products and agricultural equipment. Graduates also work with state and federal agencies.

Science/Professional (0104E) - Prepares students for admission to veterinary, medical, and/or graduate school. Graduate study can open the door to an exciting research career in specialty areas of animal or biological sciences such as genetics, nutrition, physiology or cell biology. The curriculum emphasizes advanced courses in the biological and physical sciences and includes all the pre-veterinary and pre-medicine requirements.

Combined Ag & Vet Sci (1299D) - A combined degree program available to students who gain admission to veterinary school prior to completing their bachelor’s degree. College of Agriculture and Natural Resources students who have completed at least ninety hours, including all college and university requirements, are awarded a bachelor of science degree upon successful completion of at least thirty semester hours at any accredited veterinary college. Early planning with your advisor is encouraged if you choose this option.

Minimum Grade Policy:
ANSC has a minimum grade policy which states that ANSC students must earn a "C-" or better in all major required courses, including ANSC courses and required supporting courses in other departments. Students must also have both a cumulative GPA of at least 2.0 and a 2.0 cumulative GPA in all major requirements in order to graduate. More information on this policy is available on the ANSC Minimum Grade Policy [link] page.

Astronomy Major

Under Astronomy Major [link]

- Effective Spring 2024, the program learning outcomes and course requirements changed [published December 19, 2023].

Original
See Astronomy Major [link]

Change
Program Learning Outcomes
1. Identify basic concepts from the many areas of astronomy, including motions in the sky, gravity, electromagnetic radiation, solar system, stars, and galaxies.
2. Develop mathematical skills, acquire physics knowledge, and practice applying these skills and knowledge in astrophysical situations.
3. Use astronomical telescopes/instruments and reduce astronomical data using modern computational methods.
4. Demonstrate advanced level knowledge in several different areas of astronomy.
5. Describe the current demographic composition of people working in the field of astronomy and how this affects its practice and presents barriers to broader inclusion.

Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTR120</td>
<td>Introductory Astrophysics - Solar System</td>
<td>3</td>
</tr>
<tr>
<td>ASTR121</td>
<td>Introductory Astrophysics II - Stars and Beyond</td>
<td>4</td>
</tr>
<tr>
<td>ASTR310</td>
<td>Observational Astronomy</td>
<td>4</td>
</tr>
<tr>
<td>ASTR320</td>
<td>Theoretical Astrophysics</td>
<td>3</td>
</tr>
</tbody>
</table>

Advanced Astronomy Courses
Select any two 400 level Astronomy courses of the following: 6

- ASTR406 Stellar Structure and Evolution
- ASTR410 Radio Astronomy
- ASTR415 Computational Astrophysics
- ASTR421 Galaxies

- Effective Spring 2024, the program learning outcomes and course requirements changed [published December 19, 2023].
Biochemistry Major

**Under** Biochemistry Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/computer-mathematical-natural-sciences/chemistry-biochemistry/biochemistry-major/)

- Effective Spring 2024, the course requirements changed (published December 19, 2023).

Original

See Biochemistry Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/computer-mathematical-naturalsciences/chemistry-biochemistry/biochemistry-major/).

Change

All required chemistry, biochemistry, and upper-level biological sciences courses must be passed with a minimum grade of “C-”. Required supporting courses, including BSCI170 & BSCI171, must be passed with a 2.0 grade point average.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV100</td>
<td>The Student in the University</td>
<td>1</td>
</tr>
</tbody>
</table>

**Lower-Level CHEM Courses**

| CHEM237 | Principles of Organic Chemistry I | 4 |
| CHEM247 | Principles of Organic Chemistry II | 4 |
| CHEM276 & CHEM277 | General Chemistry and Energetics - Majors and Fundamentals of Analytical and Bioanalytical Chemistry Laboratory | 5 |

**Supporting Courses**

| BSCI170 | Principles of Molecular & Cellular Biology | 4 |
| BSCI171 | Principles of Molecular & Cellular Biology Laboratory | 4 |

| MATH140 | Calculus I | 4 |
| MATH141 | Calculus II | 4 |
| MATH241 | Calculus III | 4 |
| MATH241 | Calculus III | 4 |

| CHEM395 | Professional Issues in Chemistry and Biochemistry | 1 |
| CHEM425 | Instrumental Methods of Analysis | 4 |
| CHEM481 & CHEM483 | Physical Chemistry I and Physical Chemistry Laboratory I | 5 |
| BCHM461 | Biochemistry I | 3 |
| BCHM462 | Biochemistry II | 3 |
| BCHM464 | Biochemistry Laboratory | 3 |
| BCHM465 | Biochemistry III | 3 |
| BCHM485 | Physical Biochemistry | 3 |

| Approved biological science courses | 6 |

Total Credits 73

1. Also accepted with consent of advisor: PHYS161, PHYS165, PHYS260, PHYS261, PHYS270, PHYS271 (14 credits)
2. For students with experience with computer programming this course can be replaced by PHYS474 Computational Physics or ASTR415 Computational Astrophysics. If students complete ASTR415 for this requirement, it cannot be counted as an advanced astronomy course (400-level course) requirement.
3. Completion of both MATH246 and either MATH240 or MATH461 will be accepted in place of PHYS274.

Grades in all of the above required courses must be “C-” or better.

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**Notes:**

- Specific information about course requirements can be obtained in the undergraduate office.
- Students who enroll in the chemistry or biochemistry program at any time following the first semester of study typically will complete all or part of the non-majors introductory sequence (CHEM131, CHEM132, CHEM231/CHEM232, CHEM241/CHEM242 and CHEM271/CHEM272;
CHEM132, CHEM232, CHEM242 and CHEM272 are co-requisite laboratory courses). In this situation, completion of an additional approved upper level CHEM or BCHM course may be required to fulfill the lower-level departmental major requirements. Transfer students who wish to pursue chemistry or biochemistry majors will have their previous chemistry course work carefully evaluated for placement in the appropriate courses.

• More information about and requirements for the Biochemistry major can be found at: http://www.chem.umd.edu/undergraduateprogram/current-students/majoradvising/http://www.chem.umd.edu/undergraduateprogram/current-students/majoradvising/).

Bioengineering Major

Under Bioengineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/bioengineering/bioengineering-major/)

• The accreditation statement in the program description changed (published September 7, 2023).

Original
The Bachelor of Science in Bioengineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Bioengineering and Biomedical Engineering Program Criteria.

Change
The Bachelor of Science in Bioengineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Bioengineering and Biomedical and Similarly Named Engineering Programs.

Chemical Engineering Major

Under Chemical Engineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/chemical-biomolecular-engineering/chemical-biomolecular-engineering-major/)

• The accreditation statement in the program description changed (published September 7, 2023).

Original
The Bachelor of Science in Chemical Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Chemical, Biochemical, and Biomolecular Program Criteria.

Change
The Bachelor of Science in Chemical Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Chemical, Biochemical, Biomolecular and Similarly Named Engineering Programs.

Communication Major

Under Communication Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/arts-humanities/communication/communication-major/)

• Effective Spring 2024, the course requirements changed (published December 19, 2023).

Original
See Communication Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/arts-humanities/communication/communication-major/).

Change
The course of study for a Communication major must satisfy all of the following requirements:
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Requirements</td>
<td><a href="https://academiccatalog.umd.edu/undergraduate/colleges-schools/arts-humanities/collegerequirementstext">https://academiccatalog.umd.edu/undergraduate/colleges-schools/arts-humanities/collegerequirementstext</a></td>
<td></td>
</tr>
</tbody>
</table>
| Oral Communication | Select one of the following:  
- COMM107 Oral Communication: Principles and Practices  
- COMM200 Critical Thinking and Speaking  
- COMM230 Argumentation and Debate | 3       |
| Modes of Communication Inquiry | COMM250 Introduction to Communication Inquiry | 3       |
| Fundamentals of Communication Skills | COMM130 Professional Communication and Writing | 1       |
| Select one of the following: | | 3       |
| BMGT230 | Business Statistics                                                      |         |
| STAT100 | Elementary Statistics and Probability                                    |         |
| EDCM451 | Introduction to Educational Statistics                                   |         |
| CCJS200 | Statistics for Criminology and Criminal Justice                          |         |
| PSYC200 | Statistical Methods in Psychology                                       |         |
| SOCY201 | Introductory Statistics for Sociology                                    |         |
| Select one of the following specializations: | | 36      |
| Communication Studies | |         |
| Health and Science Communication | |         |
| Media and Digital Communication | |         |
| Political Communication and Public Advocacy | |         |
| Public Relations | |         |
| Total Credits | | 46      |

**Communication Studies**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
</table>
| Communication Theory & Principles | Select two of the following:  
- COMM201 Introduction to Public Relations  
- COMM301 Rhetorical Theories  
- COMM302 Communication Science Theories  
- COMM303 Media Theory | 6       |
| Research Methods | COMM304 Communication Research Literacy | 3       |
| Research Methods | Select one of the following: | 3       |
| COMM305 | Qualitative Communication Research Methods                           |         |
| COMM306 | Rhetorical Methods in Communication                                   |         |
| COMM307 | Quantitative Methods in Communication                                 |         |
| Communication & Society | Select one of the following Leadership & Social Change courses: | 3       |
| COMM330 | Argumentation and Public Policy                                       |         |
| COMM385 | Influence                                                             |         |
| COMM420 | Theories of Group Discussion                                           |         |
| COMM421 | Communicating Leadership                                               |         |
| COMM422 | Communication Management                                               |         |
| COMM424 | Communication in Complex Organizations                                 |         |
| COMM425 | Negotiation and Conflict Management                                   |         |
| COMM428 | Special Topics Seminar in Dialogues and Deliberation                  |         |
| COMM436 | Interpersonal Arguing                                                  |         |
| COMM448 | Special Topics in Public Relations                                     |         |
| COMM449 | Special Topics in Digital Communication                                |         |
| COMM455 | Speechwriting                                                          |         |
| COMM459 | Special Topics in Science Communication                               |         |
| COMM461 | Voices of Public Leadership in the Twentieth Century                   |         |
| COMM462 | Visual Communication                                                   |         |
| COMM469 | The Discourse of Social Movements                                     |         |
| COMM470 | Listening                                                             |         |
| COMM475 | Persuasion                                                            |         |
| Applied | Select one of the following Diversity & Inclusion courses: | 3       |
| COMM324 | Communication and Gender                                               |         |
| COMM360 | The Rhetoric of Black America                                          |         |
| COMM382 | Essentials of Intercultural Communication                            |         |
| COMM454 | Rhetoric of the 1960s                                                  |         |
| COMM460 | Public Life in American Communities, 1634-1900                        |         |
| Electives | 3xx or 4xx-Level COMM Electives | 12      |
| Total Credits | | 36      |

**Health and Science Communication**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Theory &amp; Principles</td>
<td>COMM302 Communication Science Theories</td>
<td>3</td>
</tr>
<tr>
<td>Research Methods</td>
<td>Select one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>COMM201</td>
<td>Introduction to Public Relations</td>
<td></td>
</tr>
<tr>
<td>COMM301</td>
<td>Rhetorical Theories</td>
<td></td>
</tr>
<tr>
<td>COMM303</td>
<td>Media Theory</td>
<td></td>
</tr>
</tbody>
</table>
ADDENDA TO THIS CATALOG

COMM304 Communication Research Literacy 3
Select one of the following Research Methods courses: 3
COMM305 Qualitative Communication Research Methods
COMM306 Rhetorical Methods in Communication
COMM307 Quantitative Methods in Communication

Communication & Society
Select one of the following Leadership & Social Change courses: 3
COMM330 Argumentation and Public Policy
COMM385 Influence
COMM420 Theories of Group Discussion
COMM421 Communicating Leadership
COMM422 Communication Management
COMM424 Communication in Complex Organizations
COMM425 Negotiation and Conflict Management
COMM428 Special Topics Seminar in Dialogues and Deliberation
COMM436 Interpersonal Arguing
COMM448 Special Topics in Public Relations
COMM449 Special Topics in Digital Communication
COMM455 Speechwriting
COMM459 Special Topics in Science Communication
COMM461 Voices of Public Leadership in the Twentieth Century
COMM462 Visual Communication
COMM469 The Discourse of Social Movements
COMM470 Listening
COMM475 Persuasion

Select one of the following Diversity & Inclusion courses: 3
COMM324 Communication and Gender
COMM360 The Rhetoric of Black America
COMM382 Essentials of Intercultural Communication
COMM454 Rhetoric of the 1960s
COMM460 Public Life in American Communities, 1634-1900

Applied
Select one of the following: 3
COMM311 Peer Consulting in Oral Communication
COMM386 Experiential Learning
COMM388 Communication Practicum
COMM498 Seminar

Select one of the following: 3
COMM311 Peer Consulting in Oral Communication
COMM330 Argumentation and Public Policy
COMM331 News Writing and Reporting for Public Relations
COMM370 Mediated Communication
COMM371 Communication and Digital Media
COMM375 Documentary Theory and Practice
COMM386 Experiential Learning
COMM388 Communication Practicum
COMM425 Negotiation and Conflict Management
COMM426 Conflict Management
COMM455 Speechwriting
COMM471

COMM498 Seminar
Select four of the following specialization electives: 1 12

Specialization Electives
COMM398 Selected Topics in Communication (COMM398E: Health Communication)
COMM419 Special Topics in Communication
COMM422 Communication Management
COMM424 Communication in Complex Organizations
COMM426 Conflict Management
COMM427 Crisis Communication
COMM435 Theories of Interpersonal Communication
COMM459 Special Topics in Science Communication

Total Credits 36

1 The same course cannot be used to fulfill more than one requirement.

Media and Digital Communication

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM303</td>
<td>Media Theory</td>
<td>3</td>
</tr>
<tr>
<td>COMM201</td>
<td>Introduction to Public Relations</td>
<td>3</td>
</tr>
<tr>
<td>COMM301</td>
<td>Rhetorical Theories</td>
<td></td>
</tr>
<tr>
<td>COMM302</td>
<td>Communication Science Theories</td>
<td></td>
</tr>
<tr>
<td>COMM304</td>
<td>Communication Research Literacy</td>
<td>3</td>
</tr>
<tr>
<td>COMM305</td>
<td>Qualitative Communication Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>COMM306</td>
<td>Rhetorical Methods in Communication</td>
<td></td>
</tr>
<tr>
<td>COMM307</td>
<td>Quantitative Methods in Communication</td>
<td></td>
</tr>
<tr>
<td>COMM310</td>
<td>Communication Theory &amp; Principles</td>
<td></td>
</tr>
</tbody>
</table>

Research Methods
COMM304 Communication Research Literacy 3
Select one of the following Research Methods courses: 3
COMM305 Qualitative Communication Research Methods
COMM306 Rhetorical Methods in Communication
COMM307 Quantitative Methods in Communication

Communication & Society
Select one of the following Leadership & Social Change courses: 3
COMM330 Argumentation and Public Policy
COMM385 Influence
COMM420 Theories of Group Discussion
COMM421 Communicating Leadership
COMM422 Communication Management
COMM424 Communication in Complex Organizations
COMM425 Negotiation and Conflict Management
COMM428 Special Topics Seminar in Dialogues and Deliberation
COMM448 Special Topics in Public Relations
COMM449 Special Topics in Digital Communication
COMM455 Speechwriting
COMM459 Special Topics in Science Communication
COMM461 Voices of Public Leadership in the Twentieth Century
COMM462 Visual Communication
COMM469 The Discourse of Social Movements
COMM470 Listening
COMM475 Persuasion

Select one of the following Diversity & Inclusion courses: 3
ADDENDA TO THIS CATALOG

COMM324 Communication and Gender
COMM360 The Rhetoric of Black America
COMM382 Essentials of Intercultural Communication
COMM454 Rhetoric of the 1960s
COMM460 Public Life in American Communities, 1634-1900

Applied
Select one of the following: 3
COMM311 Peer Consulting in Oral Communication
COMM386 Experiential Learning
COMM388 Communication Practicum
COMM498 Seminar
Select one of the following: 3
COMM311 Peer Consulting in Oral Communication
COMM330 Argumentation and Public Policy
COMM331 News Writing and Reporting for Public Relations
COMM370 Mediated Communication
COMM371 Communication and Digital Media
COMM375 Documentary Theory and Practice
COMM386 Experiential Learning
COMM388 Communication Practicum
COMM425 Negotiation and Conflict Management
COMM426 Conflict Management
COMM455 Speechwriting
COMM471
COMM498 Seminar

Specialization Electives
Select four of the following specialization electives: 1 12
COMM370 Mediated Communication
COMM371 Communication and Digital Media
COMM372 Communication, Meaning, and Digital Media
COMM373 Communication and Digital Visual Narrative
COMM374 Communicating Visually: Message Production and Digital Media
COMM375 Documentary Theory and Practice
COMM376 Communication through Advocacy Short Film
COMM449 Special Topics in Digital Communication
COMM468 Seminar in Mediated Communication

Total Credits 36

1 The same course cannot be used to fulfill more than one requirement.

Political Communication and Public Advocacy

Course Title Credits
Communication Theory & Principles
COMM301 Rhetorical Theories 3
Select one of the following: 3
COMM201 Introduction to Public Relations
COMM302 Communication Science Theories
COMM303 Media Theory
Research Methods
COMM304 Communication Research Literacy 3
Select one of the following Research Methods courses: 3
COMM305 Qualitative Communication Research Methods
COMM306 Rhetorical Methods in Communication
COMM307 Quantitative Methods in Communication

Communication & Society
Select one of the following Leadership & Social Change courses: 3
COMM330 Argumentation and Public Policy
COMM385 Influence
COMM420 Theories of Group Discussion
COMM421 Communicating Leadership
COMM422 Communication Management
COMM424 Communication in Complex Organizations
COMM425 Negotiation and Conflict Management
COMM428 Special Topics Seminar in Dialogues and Deliberation
COMM436 Interpersonal Arguing
COMM448 Special Topics in Public Relations
COMM449 Special Topics in Digital Communication
COMM455 Speechwriting
COMM459 Special Topics in Science Communication
COMM461 Voices of Public Leadership in the Twentieth Century
COMM462 Visual Communication
COMM469 The Discourse of Social Movements
COMM470 Listening
COMM475 Persuasion
Select one of the following Diversity & Inclusion courses: 3
COMM324 Communication and Gender
COMM360 The Rhetoric of Black America
COMM382 Essentials of Intercultural Communication
COMM454 Rhetoric of the 1960s
COMM460 Public Life in American Communities, 1634-1900

Applied
Select one of the following: 3
COMM311 Peer Consulting in Oral Communication
COMM386 Experiential Learning
COMM388 Communication Practicum
COMM498 Seminar
Select one of the following: 3
COMM311 Peer Consulting in Oral Communication
COMM330 Argumentation and Public Policy
COMM331 News Writing and Reporting for Public Relations
COMM370 Mediated Communication
COMM371 Communication and Digital Media
COMM375 Documentary Theory and Practice
COMM386 Experiential Learning
COMM388 Communication Practicum
COMM425 Negotiation and Conflict Management
COMM426 Conflict Management
COMM455 Speechwriting
COMM471
COMM498 Seminar
Specialization Electives
Select four of the following specialization electives: 1 12
COMM330 Argumentation and Public Policy
COMM340 Communicating the Narrative
COMM360 The Rhetoric of Black America
COMM428 Special Topics Seminar in Dialogues and Deliberation
COMM450 Ancient and Medieval Rhetorical Theory
COMM456 Freedom of Speech & the First Amendment
COMM458 Seminar in Political Communication
COMM460 Public Life in American Communities, 1634-1900
COMM461 Voices of Public Leadership in the Twentieth Century
COMM469 The Discourse of Social Movements

Total Credits 36

1 The same course cannot be used to fulfill more than one requirement.

Public Relations
Course Title Credits
Communication Theory & Principles
COMM201 Introduction to Public Relations 3
Select one of the following: 3
COMM301 Rhetorical Theories
COMM302 Communication Science Theories
COMM303 Media Theory
Research Methods
COMM304 Communication Research Literacy 3
Select one of the following Research Methods courses: 3
COMM305 Qualitative Communication Research Methods
COMM306 Rhetorical Methods in Communication
COMM307 Quantitative Methods in Communication
Communication & Society
Select one of the following Leadership & Social Change courses: 3
COMM330 Argumentation and Public Policy
COMM385 Influence
COMM420 Theories of Group Discussion
COMM421 Communicating Leadership
COMM422 Communication Management
COMM424 Communication in Complex Organizations
COMM425 Negotiation and Conflict Management
COMM428 Special Topics Seminar in Dialogues and Deliberation
COMM436 Interpersonal Arguing
COMM448 Special Topics in Public Relations
COMM449 Special Topics in Digital Communication
COMM455 Speechwriting
COMM459 Special Topics in Science Communication
COMM461 Voices of Public Leadership in the Twentieth Century
COMM462 Visual Communication
COMM469 The Discourse of Social Movements

COMM470 Listening
COMM475 Persuasion
Select one of the following Diversity & Inclusion courses: 3
COMM324 Communication and Gender
COMM360 The Rhetoric of Black America
COMM382 Essentials of Intercultural Communication
COMM454 Rhetoric of the 1960s
COMM460 Public Life in American Communities, 1634-1900

Applied
COMM331 News Writing and Reporting for Public Relations 3
COMM386 Experiential Learning 3-6

Specialization Electives
COMM351 Public Relations Techniques 3
COMM353 New Media Writing for Public Relations 3
COMM483 Senior Seminar in Public Relations 3
COMM476 Language, Communication, and Action 3

Total Credits 36-39

Computational Finance Minor
• Effective Spring 2024, the Computational Finance Minor was established (published December 19, 2023).

Program Directors: Albert S. Kyle, Ph.D. and Louiqa Raschid, Ph.D.

The Minor in Computational Finance will provide students with proficiency in applying analytical models and machine learning methods to solve challenging financial tasks. The Minor will introduce students to (pseudo) realistic tasks faced by financial analysts and researchers, as well as the real world datasets that are widely used across the financial industry and by financial regulators (e.g., SEC, FINRA, etc.). The Minor, which is only open to Computer Science majors, will equip students with the domain specific skills needed for positions in the financial industry (banking and investment) or with financial regulators (SEC, FINRA, Fannie Mae, etc.) or to explore innovative opportunities in the Financial Technology (FinTech) industry.

Program Learning Outcomes
1. Develop proficiency in manipulating financial datasets.
2. Apply analytical models to solve challenging financial tasks.
3. Apply machine learning methods to analyze financial datasets.
4. Engage with academic and industry mentors in a capstone project.
5. Engage in experiential learning projects that are designed to solve real world problems with real datasets.
6. Demonstrate analytical thinking skills through the use and application of analytical and machine learning methods.

Requirements
Admitted Computer Science majors will begin the minor in their junior year and MATH240, MATH241, and STAT400 (or equivalent courses) should be completed prior to entering the program. CMSC320 (or an equivalent course) should be completed either prior to beginning the minor or during a student's first semester in the minor.
STUDENT LEARNING OUTCOMES

Original

STUDENT LEARNING OUTCOMES

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. The ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments that must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Economics Major

Original

See Economics Major.(https://academiccatalog.umd.edu/undergraduate/colleges-schools/behavioral-social-sciences/economics/economics-major/).

Change

In addition to the university's general education requirements, students must earn a minimum of 41 credits via a combination of foundation and elective courses in economics and math as listed below. Both the Bachelor of Arts and the Bachelor of Science tracks require a sequence of courses starting with introductory micro and macroeconomics, as well as calculus. Students then proceed to intermediate level courses in theory and statistics. Finally, students take at least one upper-level course focused on quantitative analysis plus several upper-level courses where you explore specific topics in more depth. Both tracks require the same number of courses.

All courses must be passed with a grade of "C-" or better to count towards the foundation and elective requirements. Students must have a minimum 2.0 cumulative grade point average across all courses used to satisfy major degree requirements. A course used to fulfill one requirement for the major may not count towards any other economics major requirement.

Bachelor of Arts

Course Title Credits
College Requirements (https://academiccatalog.umd.edu/undergraduate/colleges-schools/behavioral-social-sciences/ #collegerequirementstext)
Bachelor of Science

Foundation Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON200</td>
<td>Principles of Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON201</td>
<td>Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>MATH120</td>
<td>Elementary Calculus I</td>
<td>3-4</td>
</tr>
<tr>
<td>or MATH140</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>ECON230</td>
<td>Applied Economic Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or BMGT230</td>
<td>Business Statistics</td>
<td></td>
</tr>
<tr>
<td>ECON305</td>
<td>Intermediate Macroeconomic Theory and Policy</td>
<td>4</td>
</tr>
<tr>
<td>ECON306</td>
<td>Intermediate Microeconomic Theory &amp; Policy</td>
<td>4</td>
</tr>
</tbody>
</table>

Economics Courses of Choice

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON422</td>
<td>Macroeconomic Models and Forecasting</td>
</tr>
<tr>
<td>ECON414</td>
<td>Game Theory</td>
</tr>
<tr>
<td>ECON424</td>
<td>Applied Econometrics</td>
</tr>
<tr>
<td>ECON425</td>
<td>Mathematical Economics</td>
</tr>
<tr>
<td>ECON426</td>
<td>Economics of Cost-Benefit Analysis</td>
</tr>
</tbody>
</table>

Select two 300 or 400 level ECON courses designated for B.A. 6
Select three 400 level ECON courses designated for B.A. 9
Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON386</td>
<td>Experiential Learning</td>
</tr>
<tr>
<td>Other experiential learning course(s)</td>
<td></td>
</tr>
<tr>
<td>300 or 400 level ECON course designated for the B.A.</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 41-42

The Economics curriculum may be updated over time, given college and campus approval. Students will be notified as other appropriate courses are approved that fulfill the requirements for the major.

Other Requirements for the Major

Study Sequences and Plans of Study

Those students planning to pursue graduate study in economics must begin to prepare themselves analytically for graduate work by focusing on theory, statistics, and mathematics in their undergraduate curriculum. These students should consider the full econometrics sequence of ECON422 and ECON423. Mastery of advanced calculus and linear algebra is essential for entrance into graduate schools, and therefore students must take MATH140, MATH141, MATH240, MATH241 and MATH246. Students should also plan on taking MATH410 and MATH411.

Benchmarks

In accordance with the university's policies, the Department of Economics expects students to make timely progress towards graduation. To help measure progress during the early stages of a student's studies in economics, students will have to complete courses designated as benchmarks within a specified number of semesters in order to continue in their major.

Bachelor of Arts

Students must complete the following five courses within two semesters of entering the major:

- ECON200, ECON201, and MATH120 or MATH140 with grades of C- or higher
- One additional GenEd course with a D- or higher
- Academic Writing with a C- or higher

Bachelor of Science

Students must complete the following six courses within two semesters of entering the major:

- ECON200, ECON201, MATH140, and ECON300 with grades of C- or higher
- One additional GenEd course with a D- or higher
- Academic Writing with a C- or higher

These benchmark deadlines may not be appropriate for all incoming students (depending upon credit earned prior to entering the major and math placement). All students complete an individualized benchmark contract with an ECON advisor, either at orientation or in the process of declaring the major. Freshmen wishing to declare an Economics major should see an advisor as soon as possible in order to set appropriate benchmarks and establish a coherent graduation plan.

Electrical Engineering Major

Under Electrical Engineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/electrical-and-computer/electrical-engineering-major/)

- The accreditation statement in the program description changed (published September 7, 2023).
ADDENDA TO THIS CATALOG

Original
The Bachelor of Science degree in Electrical Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Electrical and Electronics Engineering Program Criteria.

Change
The Bachelor of Science degree in Electrical Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs.

Environmental Science and Technology Major

Under Environmental Science and Technology Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/agriculture-natural-resources/environmental-science-technology/environmental-science-technology-major/#requirementstext)

• Effective Spring 2024, the course requirements changed (published December 19, 2023).

Original

Change
This program requires a total of 120 credits for a Bachelor of Science, including the general education program course credits, required major credits; Technology and Ecosystem elective credits, and free elective credits. All courses counted toward the major must be completed with a C- or better. An overall GPA of 2.0 in major courses is required for graduation.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENST389</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Concentration (See list below)</strong></td>
<td>33-36</td>
</tr>
<tr>
<td>ENST388</td>
<td>Honors Thesis Research</td>
<td></td>
</tr>
<tr>
<td>ENST470</td>
<td>Ideas into Impact</td>
<td></td>
</tr>
<tr>
<td>ENST486</td>
<td>Senior Professional Experience</td>
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<tr>
<td>ENST472</td>
<td>Capstone</td>
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<tr>
<td>Total Credits</td>
<td><strong>77-80</strong></td>
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</tbody>
</table>

Concentrations:

Ecological Technology Design

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Concentration Core</strong></td>
<td></td>
</tr>
<tr>
<td>ENST281</td>
<td>Computer Aided Design in Ecology</td>
<td>2</td>
</tr>
<tr>
<td>ENST481</td>
<td>Ecological Design</td>
<td>4</td>
</tr>
<tr>
<td>MATH121</td>
<td>Elementary Calculus II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Concentration Depth - Ecology (2 Courses)</strong></td>
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</tr>
<tr>
<td>ENST410</td>
<td>Ecosystem Services: An Integrated Analysis</td>
<td></td>
</tr>
<tr>
<td>ENST422</td>
<td>Soil Microbial Ecology</td>
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</tr>
<tr>
<td>ENST450</td>
<td>Wetland Ecology</td>
<td></td>
</tr>
<tr>
<td>ENST453</td>
<td>Watershed Science: Water Balance, Open Channel Flow, and Near Surface Hydrology</td>
<td></td>
</tr>
<tr>
<td>GEOL453</td>
<td>Ecosystem Restoration</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Concentration Depth - Design (3 Courses)</strong></td>
<td>9</td>
</tr>
<tr>
<td>ENST282</td>
<td>Ecological Innovation and Entrepreneurship</td>
<td></td>
</tr>
<tr>
<td>ENST405</td>
<td>Energy and Environment</td>
<td></td>
</tr>
<tr>
<td>ENST415</td>
<td>Renewable Energy</td>
<td></td>
</tr>
<tr>
<td>ENST443</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENST485</td>
<td>Water Management in Urban Environment</td>
<td></td>
</tr>
<tr>
<td>ENST456</td>
<td>Spatial Analysis and Ecological Sampling</td>
<td></td>
</tr>
<tr>
<td>or GEOG272</td>
<td>Introduction to Earth Observation Science</td>
<td></td>
</tr>
<tr>
<td>or GEOG373</td>
<td>Geographic Information Systems</td>
<td></td>
</tr>
<tr>
<td>or INAG237</td>
<td>GPS &amp; Drone Applications in Surveying</td>
<td></td>
</tr>
<tr>
<td>GEOG331</td>
<td>Introduction to Human Dimensions of Global Change</td>
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<tr>
<td>LARC452</td>
<td>Green Infrastructure and Community Greening</td>
<td></td>
</tr>
<tr>
<td>PLSC480</td>
<td>Urban Ecology</td>
<td></td>
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<tr>
<td></td>
<td><strong>Sustainable Technology:</strong></td>
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</tr>
<tr>
<td>ENST432</td>
<td>Environmental Microbiology</td>
<td></td>
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<tr>
<td>ENST441</td>
<td>Sustainable Agriculture</td>
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<td>GEOL453</td>
<td>Ecosystem Restoration</td>
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<tr>
<td>INAG250</td>
<td>Fundamentals of Agricultural Mechanics</td>
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<td>PLSC425</td>
<td>Green Roofs and Urban Sustainability</td>
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<tr>
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<td><strong>Wetlands:</strong></td>
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<tr>
<td>ENST430</td>
<td>Wetland Soils</td>
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<tr>
<td>ENST450</td>
<td>Wetland Ecology</td>
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<tr>
<td>ENST452</td>
<td>Wetland Restoration</td>
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<tr>
<td>GEOL452</td>
<td>Watershed and Wetland Hydrology</td>
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Ecology and Ecosystem Management:
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<tr>
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<tr>
<td>BSCI467</td>
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<tr>
<td>ENST373</td>
<td>Natural History of the Chesapeake Bay</td>
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<td>ENST460</td>
<td>Principles of Wildlife Management</td>
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<td>PLSC471</td>
<td>Forest Ecology</td>
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**Total Credits:** 36

### Ecosystem Health

<table>
<thead>
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<tr>
<td>ENST333</td>
<td>Ecosystem Health and Protection</td>
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<tr>
<td>ENST334</td>
<td>Environmental Toxicology</td>
<td>3</td>
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<tr>
<td>ENST436</td>
<td>Emerging Environmental Threats</td>
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<tr>
<td>BSCI207</td>
<td>Principles of Biology III - Organismal Biology</td>
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<tr>
<td>BSCI222</td>
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<tr>
<td>or BSCI223</td>
<td>General Microbiology</td>
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**Concentration Depth (2 Courses):** 6

- ENST403 Invasive Species Ecology
- ENST423 Soil-Water Pollution
- ENST432 Environmental Microbiology
- ENST445 Ecological Risk Assessment

### Ecosystem Health Technical Electives

**12 Credits**

**Environmental Health:**
- ENST403 Invasive Species Ecology
- ENST423 Soil-Water Pollution
- ENST434 Toxic Contaminants: Sources, Fate, and Effects
- ENST436 Emerging Environmental Threats
- ENST445 Ecological Risk Assessment

**Environmental Science and Management:**
- ENST405 Energy and Environment
- GEOG415 Land Use, Climate Change, and Sustainability
- GEOL452 Watershed and Wetland Hydrology
- ENST432 Environmental Microbiology
- LARC450 Environmental Resources

**Ecological Processes:**
- ENST422 Soil Microbial Ecology
- ENST450 Wetland Ecology
- ENST460 Principles of Wildlife Management
- PLSC400 Plant Physiology
- BSCI467 Freshwater Biology

**Human Health:**
- BSCI424 Pathogenic Microbiology
- BSCI425 Advanced Cell Biology Lab Practices
- BSCI437 General Virology
- BSCI450 Mammalian Systems Physiology

**Chemistry Depth:**
- CHEM241 Organic Chemistry II
- CHEM242 Organic Chemistry Laboratory II

**Cultural or Social Dimensions:**
- ENST410 Ecosystem Services: An Integrated Analysis
- GEOG331 Introduction to Human Dimensions of Global Change
- GEOG431 Culture and Natural Resource Management

### Natural Resources Management

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<tr>
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<tr>
<td>BSCI222</td>
<td>Principles of Genetics</td>
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<td>ENST214</td>
<td>Introduction to Fish and Wildlife Sciences</td>
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<tr>
<td>ENST487</td>
<td>Environmental Conflicts and Decision Making</td>
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**Concentration Depth (4 Courses):** 12

- ENST456 Spatial Analysis and Ecological Sampling
- or GEOG272 Introduction to Earth Observation Science
- or GEOG373 Geographic Information Systems
- or INAG237 GPS & Drone Applications in Surveying
- ENST450 Wetland Ecology
- or ENST453 Watershed Science: Water Balance, Open Channel Flow, and Near Surface Hydrology
- AREC240 Introduction to Economics and the Environment
- or AREC241 Environment, Economics and Policy
- or ENST410 Ecosystem Services: An Integrated Analysis
- or AREC250 Elements of Agricultural and Resource Economics

**Environmental Health:**
- ENST403 Invasive Species Ecology
- ENST423 Soil-Water Pollution
- ENST434 Toxic Contaminants: Sources, Fate, and Effects
- ENST436 Emerging Environmental Threats
- ENST445 Ecological Risk Assessment

**Environmental Science and Management:**
- ENST405 Energy and Environment
- GEOG415 Land Use, Climate Change, and Sustainability
- GEOL452 Watershed and Wetland Hydrology
- ENST432 Environmental Microbiology
- LARC450 Environmental Resources

**Ecological Processes:**
- ENST422 Soil Microbial Ecology
- ENST450 Wetland Ecology
- ENST460 Principles of Wildlife Management
- PLSC400 Plant Physiology
- BSCI467 Freshwater Biology

**Human Health:**
- BSCI424 Pathogenic Microbiology
- BSCI425 Advanced Cell Biology Lab Practices
- BSCI437 General Virology
- BSCI450 Mammalian Systems Physiology

**Chemistry Depth:**
- CHEM241 Organic Chemistry II
- CHEM242 Organic Chemistry Laboratory II

**Cultural or Social Dimensions:**
- ENST410 Ecosystem Services: An Integrated Analysis
- GEOG331 Introduction to Human Dimensions of Global Change
- GEOG431 Culture and Natural Resource Management

**Natural Resources Management Technical Electives: 12 Credits**

**Wildlife:**
- ENST460 Principles of Wildlife Management
- ENST461 Urban Wildlife Management
- BSCI334 Mammalogy & BSCI335 and Mammalogy Laboratory
- ENSP102 Introduction to Environmental Policy
- PLSC254 Woody Plants for Mid-Atlantic Landscape II
- ENSP330 Introduction to Environmental Law
- or GVPT273 Introduction to Environmental Politics

**Fisheries:**
- ENST314 Fisheries Management and Sustainability
- COMM250 Introduction to Communication Inquiry
- COMM382 Essentials of Intercultural Communication
- GEOG331 Introduction to Human Dimensions of Global Change
- GEOG416 Conceptualizing and Modeling Human-Environmental Interactions
- ENSP102 Introduction to Environmental Policy
- ENSP330 Introduction to Environmental Law
- GVPT273 Introduction to Environmental Politics

**Wetlands:**
- ENST430 Wetland Soils
- ENST450 Wetland Ecology
- ENST452 Wetland Restoration

**Total Credits:** 34
### Soil and Watershed Science

**Concentration Core**

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<td>GEOL100 &amp; GEOL110</td>
<td>Physical Geology and Physical Geology Laboratory</td>
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<td>ENST456</td>
<td>Spatial Analysis and Ecological Sampling</td>
<td>3</td>
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<tr>
<td>or ENST472</td>
<td>Introduction to Earth Observation Science</td>
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<tr>
<td>or ENST437</td>
<td>Geographic Information Systems</td>
<td></td>
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<tr>
<td>or INAG237</td>
<td>GPS &amp; Drone Applications in Surveying</td>
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**Concentration Depth - Soil Sciences**

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<td>ENST411</td>
<td>Principles of Soil Fertility</td>
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<td>ENST414</td>
<td>Soil Morphology, Genesis and Classification</td>
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<td>ENST417</td>
<td>Soil Hydrology and Physics</td>
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<td>ENST421</td>
<td>Soil Chemistry</td>
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<td>ENST422</td>
<td>Soil Microbial Ecology</td>
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**Concentration Depth - Field Experiences**

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<td>Field Soil Morphology I</td>
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<td>ENST302</td>
<td>Field Soil Morphology II</td>
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<td>ENST303</td>
<td>Field Soil Morphology III</td>
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<td>ENST309</td>
<td>Advanced Field Soil Morphology</td>
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<td>ENST424</td>
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<td>ENST430</td>
<td>Wetland Soils</td>
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<td>ENST441</td>
<td>Sustainable Agriculture</td>
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<td>ENST450</td>
<td>Wetland Ecology</td>
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**Concentration Depth - Systems**

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<td>ENST410</td>
<td>Ecosystem Services: An Integrated Analysis</td>
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<tr>
<td>ENST432</td>
<td>Environmental Microbiology</td>
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<tr>
<td>PLSC400</td>
<td>Plant Physiology</td>
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### Soil and Watershed Science Technical Electives

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<td>AREC365</td>
<td>World Hunger, Population, and Food Supplies</td>
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<tr>
<td>PLSC303</td>
<td>Global Food Systems</td>
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<td>PLSC405</td>
<td>Agroecology</td>
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<tr>
<td>BSCI223</td>
<td>General Microbiology</td>
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<tr>
<td>BSCI337</td>
<td>Biology of Insects</td>
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<td>BSCI467</td>
<td>Freshwater Biology</td>
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<td>ENST410</td>
<td>Ecosystem Services: An Integrated Analysis</td>
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<td>GEO322</td>
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<td>GEOL340</td>
<td>Geomorphology</td>
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<td>GEOL341</td>
<td>Structural Geology</td>
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<td>GEOL342</td>
<td>Sedimentation and Stratigraphy</td>
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<td>GEOL444</td>
<td>Low Temperature Geochemistry</td>
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**Watersheds:**

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<tr>
<td>ENST334</td>
<td>Environmental Toxicology</td>
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<tr>
<td>ENST423</td>
<td>Soil-Water Pollution</td>
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<tr>
<td>ENST453</td>
<td>Watershed Science: Water Balance, Open Channel Flow, and Near Surface Hydrology</td>
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<tr>
<td>GEOL451</td>
<td>Groundwater</td>
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<tr>
<td>GEOL452</td>
<td>Watershed and Wetland Hydrology</td>
<td></td>
</tr>
<tr>
<td>GEOL453</td>
<td>Ecosystem Restoration</td>
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### Fire Protection Engineering Major

**Under [Fire Protection Engineering Major](https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/fire-protection-engineering/fire-protection-engineering-major/)**

1. The senior design project statement in the program description changed (published August 11, 2023).
2. The accreditation statement in the program description changed (published September 7, 2023).

**Original**

1. A senior design or research project is required which gives the student an opportunity to explore issues beyond the normal classroom environment.
2. The Bachelor of Science degree in Fire Protection Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Fire Protection Engineering Program Criteria.

**Change**

1. A senior capstone design project is included in a course that allows students who are nearing graduation to integrate the knowledge and skills they have acquired in their program and apply them to develop fire protection solutions to complex, yet practical, challenges.
2. The Bachelor of Science degree in Fire Protection Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the
FREN204 French Grammar and Composition 3
FREN250 Introduction to Cultural and Textual Analysis 3
FREN301 Composition and Style 3
FREN387 Critical Writing on France and the French-Speaking World 3

Select two of the following: 6
- FREN302 Introduction to Translation
- FREN306 Commercial French I
- FREN312 France Today
- FREN313 (Current Issues in the French-Speaking World)
- FREN399 Directed Study in French

FREN351 From Romanticism to the Age of Modernism and Beyond 3
FREN352 From the Age of Epic and Romance to the Enlightenment 3

Select four additional FREN4xx level courses in literature, linguistics, film, and culture, of which only one may be in English. FREN387 must be completed before any FREN4xx level course offered in French.

Total Credits 36

Students must earn a grade of "C-" or higher in each course applied toward a major or minor in the School of Languages, Literatures, and Cultures. Additionally, an overall GPA of 2.0 in a major or minor is required for graduation.

Global Terrorism Studies Minor


- Effective Spring 2024, course requirements changed (published December 19, 2023).

Original


Change

Course Title Credits
BSST377 Applying Theory to the Practice of Countering Terrorism 1
BSST330 Terrorism Studies 3
BSST386 Experiential Learning in Terrorism Studies (Not repeatable) 1
Innovative Ideas Requirement (choose one of the following) 3
- BSST331 Innovations in Counterterrorism
- BSST335 Innovations in Countering Violent Extremism

\[ \text{Credits} = 17 \]
ELECTIVES

Six additional elective credits from within Terrorism Studies (BSST) ¹

Select one of the following Global Perspective courses:

ANTH265 Anthropology of Global Health
AREC345 Global Poverty and Economic Development
AREC365 World Hunger, Population, and Food Supplies
ENES269 Topics in Grand Challenges for Engineering in a Global Context
ENES316 Global Leadership in Engineering, Business, & Technology
ENES464 International Entrepreneurship and Innovation
ENES472 Leading Global Teams and Engaging Across Cultures in Business, Engineering, and Technology
ENES474 Global Perspectives of Engineering
GEOG330 As the World Turns: Society and Sustainability in a Time of Great Change
GVPT200 International Political Relations
GVPT204 Uncertain Partners: US and China in a Changing World
GVPT206 Appetite for Change: Politics and the Globalization of Food
GVPT210 Religions, Beliefs, and World Affairs
GVPT280 The Study of Comparative Politics
GVPT282 The Politics of Global Development
GVPT306 Global Environmental Politics
GVPT309 Topics in International Relations
GVPT354 International Development and Conflict Management
GVPT359 Topics in Comparative Politics
GVPT409 Seminar in International Relations and World Politics (GVPT409J: Multi-Track Diplomacy & Conflict Transformation)
GVPT409 Seminar in International Relations and World Politics (GVPT409K: Workshop in Multi-Track Diplomacy)

Total Credits 17

¹ Upon approval from the Director, students may substitute a relevant course outside BSST. If BSST331 is taken to fulfill the Innovative Ideas requirement, BSST335 can be taken to fulfill 3 BSST elective credits; if BSST335 is taken to fulfill the Innovative Ideas requirement, BSST331 can be taken to fulfill 3 BSST elective credits.

All courses used to satisfy the requirements of the minor must be completed with a grade of "C-" or better. Students must have a minimum 2.0 cumulative grade point average across all courses used to satisfy the minor requirements.

Program Director: Polly Sebastian-Schurer

The Kinesiology minor in Biomechanics and Motor Control provides a depth of knowledge to enhance students' chosen major, so they excel in their careers after graduation. This minor focuses on the study of human movement and the physical and physiological principles upon which it depends and the influence of growth and development upon human and motor performance. Note: The Biomechanics and Motor Control minor is not open to declared Kinesiology majors. Minor courses are offered over summer/winter and students may need to utilize these offerings to complete the minor.

Program Learning Outcomes

1. Students will interpret, synthesize, and critically analyze research underlying the kinesiological dimensions of physical activity and health that are specific to biomechanics and motor control.
2. Students will develop principled reasoning skills necessary to apply and extend kinesiology knowledge to address problems that are relevant to physical activity and the health of diverse populations in relation to biomechanics and motor control.
3. Students will integrate, interrogate, and communicate the connection between the scholarship of kinesiology and the goals of public health in relation to biomechanics and motor control.
4. Students will engage in physical activities both within their formal curriculum with the goal of asserting the importance of lifelong physical activity.
5. Students will integrate their physical activity experiences with kinesiology sub-disciplinary knowledge of biomechanics and motor control.

Requirements

Students are required to have BSCI170 and BSCI201 or PHYS121 (or equivalents) completed.

Course Title Credits
KNES1XX (Physical Activity Course) 1-2
Choose five of the following: 15

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<tr>
<td>KNES226</td>
<td>The Cybernetic Human</td>
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<tr>
<td>KNES265</td>
<td>Mathematical, Physical, &amp; Statistical Basis of Kinesiology</td>
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<tr>
<td>KNES300</td>
<td>Biomechanics of Human Motion</td>
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<td>KNES306</td>
<td>Prosthetics for Limb Amputations</td>
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<tr>
<td>KNES350</td>
<td>The Psychology of Sports &amp; Exercise</td>
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<td>KNES370</td>
<td>Motor Development</td>
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<td>KNES385</td>
<td>Motor Control and Learning</td>
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<td>KNES402</td>
<td>Biomechanics of Sport</td>
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<td>KNES462</td>
<td>Neural Basis of Human Movement</td>
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<td>KNES474</td>
<td>Quantitative Methods in Cognitive Motor Behavior - MATLAB</td>
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<tr>
<td>KNES498</td>
<td>Special Topics in Kinesiology (KNES498V Clinical Biomechanics: Musculoskeletal Injury)</td>
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Total Credits 16-17

Kinesiology: Biomechanics and Motor Control Minor

• Effective Spring 2024, the Kinesiology: Biomechanics and Motor Control Minor was established (published December 19, 2023).
Kinesiology: Exercise Physiology Minor

- Effective Spring 2024, the Kinesiology: Exercise Physiology Minor was established (published December 19, 2023).

Program Director: Polly Sebastian-Schurer

The Kinesiology minor in Exercise Physiology provides a depth of knowledge to enhance students’ chosen major, so they excel in their careers after graduation. The minor offers access to knowledge in a broad range of areas, including whole-body and molecular aspects of cardiovascular physiology, metabolism, aging, health, and disease. Note: The Exercise Physiology minor is not open to declared Kinesiology majors. Minor courses are offered over summer/winter and students may need to utilize these offerings to complete the minor.

Program Learning Outcomes

1. Students will interpret, synthesize, and critically analyze research underlying the kinesiological dimensions of physical activity and health that are specific to exercise physiology.
2. Students will develop principled reasoning skills necessary to apply and extend kinesiology knowledge to address problems that are relevant to physical activity and the health of diverse populations in relation to exercise physiology.
3. Students will integrate, interrogate, and communicate the connection between the scholarship of kinesiology and the goals of public health in relation to exercise physiology.
4. Students will engage in physical activities both within their formal curriculum with the goal of asserting the importance of lifelong physical activity.
5. Students will integrate their physical activity experiences with kinesiology sub-disciplinary knowledge of exercise physiology.

Requirements

At least nine credits must be at the 300 or 400 level. Please note that many of the upper-level courses have prerequisites. Students should have completed MATH113 or higher, or have a minimum eligibility for MATH120, in order to take any necessary prerequisite courses for this minor.

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<tr>
<td>KNES260</td>
<td>Science of Physical Activity and Cardiovascular Health</td>
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<td>KNES282</td>
<td>Basic Care and Prevention of Athletic Injuries</td>
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<td>KNES289</td>
<td>Topical Investigations (KNES289F Foundations of Food, Physical Activity, &amp; Health)</td>
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<td>KNES320</td>
<td>Physiological Basis of Physical Activity and Human Health</td>
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<td>KNES332</td>
<td>Exercise Testing &amp; Prescription for Fitness Professionals</td>
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<td>KNES350</td>
<td>The Psychology of Sports &amp; Exercise</td>
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<td>KNES360</td>
<td>Physiology of Exercise</td>
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<td>KNES445</td>
<td>Exercise and Brain Health</td>
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<td>KNES460</td>
<td>Physiology of Aging and the Impact of Physical Activity</td>
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<td>KNES464</td>
<td>Exercise Metabolism: Role in Health and Disease</td>
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Kinesiology: Sport, Commerce, & Culture Minor

- Effective Spring 2024, the Kinesiology: Sport, Commerce, & Culture Minor was established (published December 19, 2023).

Program Director: Polly Sebastian-Schurer

The Kinesiology minor in Sport, Commerce, & Culture provides a depth of knowledge to enhance students’ chosen major, so they excel in their careers after graduation. The minor provides students with an opportunity to study the structure and experience of contemporary sport culture from an interdisciplinary perspective, informed by research, theories, and methods drawn largely—but not exclusively—from anthropology, cultural studies, economics, gender studies, history, race and ethnic studies, urban studies, and sociology. Note: The Sport, Commerce, & Culture minor is not open to declared Kinesiology majors. Minor courses are offered over summer/winter and students may need to utilize these offerings to complete the minor.

Program Learning Outcomes

1. Students will interpret, synthesize, and critically analyze research underlying the kinesiological dimensions of physical activity and health that are specific to Sport, Commerce, Culture.
2. Students will develop principled reasoning skills necessary to apply and extend kinesiology knowledge to address problems that are relevant to physical activity and the health of diverse populations in relation to Sport, Commerce, Culture.
3. Students will integrate, interrogate, and communicate the connection between the scholarship of kinesiology and the goals of public health in relation to Sport, Commerce, Culture.
4. Students will engage in physical activities both within their formal curriculum with the goal of asserting the importance of lifelong physical activity.
5. Students will integrate their physical activity experiences with kinesiology sub-disciplinary knowledge of Sport, Commerce, Culture.

Requirements

At least nine credits must be at the 300 or 400 level.

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<th>Credits</th>
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<td>KNES1XX</td>
<td>(Physical Activity Course)</td>
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Choose four of the following: 12

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<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNES225</td>
<td>Hoop Dreams: Black Masculinity and Sport</td>
<td></td>
</tr>
<tr>
<td>KNES285</td>
<td>History of Physical Culture, Sport, &amp; Science in America</td>
<td></td>
</tr>
<tr>
<td>KNES289</td>
<td>Topical Investigations (KNES289F Baseball: The National Pastime?)</td>
<td></td>
</tr>
<tr>
<td>KNES342</td>
<td>Sport, Commerce, and Culture in the Global Marketplace</td>
<td></td>
</tr>
<tr>
<td>KNES346</td>
<td>Sport for Development</td>
<td></td>
</tr>
<tr>
<td>KNES347</td>
<td>Sport Economics</td>
<td></td>
</tr>
</tbody>
</table>
Information Science Major

Under Information Science Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/information-studies/information-science-major/)

- Effective Spring 2024, the program description and course requirements changed (published December 19, 2023).

Original
See Information Science Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/information-studies/information-science-major/).

Change
The field of information science, particularly in the iSchool, is a field concerned with the intersections of information, people, and technology. Information science is an interdisciplinary field, drawing from other areas of study such as computer science, management, social science, education, and the humanities, but with a focus on individual and institutional users of information and their information needs. In our program students gain the knowledge and the skills for creating information systems, resources, and services that help address society's pressing needs in a variety of contexts and in a variety of private and public sector positions, ranging from financial services to healthcare; from information technology to consulting; and from education to cultural institutions.

Restriction: Students are not permitted to double-major or double-degree with the Bachelor of Arts in Technology and Information Design.

Requirements
Students must earn a "C-" or better in all major requirements and an overall average of 2.0.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH115</td>
<td>Precalculus</td>
<td>3</td>
</tr>
<tr>
<td>PSYC100</td>
<td>Introduction to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>STAT100</td>
<td>Elementary Statistics and Probability</td>
<td>3</td>
</tr>
<tr>
<td>INST126</td>
<td>Introduction to Programming for Information Science</td>
<td>3</td>
</tr>
</tbody>
</table>

Major Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST201</td>
<td>Introduction to Information Science</td>
<td>3</td>
</tr>
<tr>
<td>INST311</td>
<td>Information Organization</td>
<td>3</td>
</tr>
<tr>
<td>INST314</td>
<td>Statistics for Information Science</td>
<td>3</td>
</tr>
<tr>
<td>INST326</td>
<td>Object-Oriented Programming for Information Science</td>
<td>3</td>
</tr>
<tr>
<td>INST327</td>
<td>Database Design and Modeling</td>
<td>3</td>
</tr>
<tr>
<td>INST335</td>
<td>Organizations, Management and Teamwork</td>
<td>3</td>
</tr>
<tr>
<td>INST346</td>
<td>Technologies, Infrastructure and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>INST352</td>
<td>Information User Needs and Assessment</td>
<td>3</td>
</tr>
<tr>
<td>INST362</td>
<td>User-Centered Design</td>
<td>3</td>
</tr>
<tr>
<td>INST490</td>
<td>Integrated Capstone for Information Science</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 16-17

Major Elective Requirements
Select ONE of the following options: 15

1. Complete at least 15 credits of INST-coded major electives 2
2. InfoSci Cognate Area: Data Science, Cybersecurity and Privacy, Digital Curation, and Health Information (See below for more information)

Total Credits 57

1 Other courses exist which fulfill this requirement. Please check with your advisor to make sure that a particular course fulfills this requirement before registering.
2 Check Testudo for currently available INST elective courses.

Data Science Cognate Area
The original cognate area in the InfoSci program allows students develop understanding and skills for managing, manipulating, and mobilizing data to develop insight, create value, and achieve organizational goals in a wide range of sectors. The two career streams students aim for after completing this cognate area are data analysts - focusing on analyzing and reporting data - and data stewards - focusing on extracting, manipulating, and preparing data for quicker and more efficient analysis.

Cybersecurity and Privacy Cognate Area
This cognate area is based on the perspective that a comprehensive and effective understanding of issues surrounding cybersecurity should encompass both technological and human aspects. This cognate area helps students equip themselves with human-centered cybersecurity skills and perspectives, and prepare to launch careers in the cybersecurity field with particular emphasis on management, policy, and governance-related functions.

Digital Curation Cognate Area
This cognate area prepares students for jobs where they collect, digitize, appraise, curate, and disseminate information assets effectively and efficiently. Information is at the heart of our society's ability to learn, conduct business, recreate, and manage complex scientific, technological, industrial, and information infrastructures. Students focusing in this cognate area will play critical roles in preserving a vast and varied body of information for posterity.

Health Information Cognate Area
This cognate area teaches students about the ways data informs the decisions made by health professionals, patients, and policy makers. Students focusing in this cognate area will learn about designing patient-centered technologies, health informatics for patients and consumers, and health data analytics.

Information Science Major at Shady Grove

Under Information Science Major at Shady Grove (https://academiccatalog.umd.edu/undergraduate/colleges-schools/universities-shady-grove/information-studies/information-science/#text)

- Effective Spring 2024, the program description changed (published December 19, 2023).
Materials Science and Engineering Major


- The accreditation statement in the program description changed (published September 7, 2023).

Original

The Bachelor of Science in Materials Science and Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Materials Engineering Program Criteria.

Change

The Bachelor of Science in Materials Science and Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Materials, Metallurgical, Ceramics and Similarly Named Engineering Programs.

Mechanical Engineering Major

Under Mechanical Engineering Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/engineering/mechanical-engineering/mechanical-engineering-major/)

- The accreditation statement in the program description changed (published September 7, 2023).

Original

The Bachelor of Science in Mechanical Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Mechanical Engineering Program Criteria.

Change

The Bachelor of Science in Mechanical Engineering degree program at the University of Maryland is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Mechanical and Similarly Named Engineering Programs.

The Robert H. Smith School of Business

Under The Robert H. Smith School of Business - Transfer Admission for Students from on or off Campus (https://academiccatalog.umd.edu/undergraduate/colleges-schools/business/#transfer-admission)

- The cumulative grade point average requirement for competitive review for admission changed (published October 10, 2023).
- The cumulative grade point average requirement for direct admission changed (published October 10, 2023).
- The listing of gateway courses changed (published October 10, 2023).

Original

A minimum grade point average of 3.0 in all college coursework is required for consideration for all internal and external transfer applicants. As of Fall 2019, admitted University of Maryland students applying to Business, who have completed all of the LEP gateway requirements, and have a 3.0 - 3.799 cumulative grade point average across all attempted college coursework will undergo a competitive review for admission to the Business major. Admitted University of Maryland students applying to Business, who have completed all of the LEP gateway requirements, and have a 3.8 or higher cumulative grade point average across all attempted college coursework will be admitted into the Business major.

- Completion of the following gateway courses, all with "C-" or better:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT220</td>
<td>Principles of Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>MATH120</td>
<td>Elementary Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>MATH130</td>
<td>Calculus I for the Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>MATH136</td>
<td>Calculus for Life Sciences</td>
<td>4</td>
</tr>
</tbody>
</table>
The following courses are approved substitutes for BMGT230:
- BIOM301
- CCJS200
- ECON230
- ECON321
- EDM451
- GEOS305
- INST314
- PSYC200
- and SOCY201.

The following courses are approved substitutes for BMGT231:
- BIOE372
- ENCE302
- ENEE324
- ENME392
- or STAT400

A minimum grade point average of 3.0 in all college coursework is required for consideration for all internal and external transfer applicants. As of Fall 2023, admitted University of Maryland students applying to Business, who have completed all of the LEP gateway requirements, and have a 3.0 - 3.599 cumulative grade point average across all attempted college coursework will undergo a competitive review for admission to the Business major. Admitted University of Maryland students applying to Business, who have completed all of the LEP gateway requirements, and have a 3.6 or higher cumulative grade point average across all attempted college coursework will be directly admitted into the Business major.

Completion of the following gateway courses, all with "C-" or better:

Course | Title | Credits
--- | --- | ---
BMGT220 | Principles of Accounting I | 3

Calculus

Select one of the following:

- MATH120: Elementary Calculus I
- MATH136: Calculus for Life Sciences
- MATH140: Calculus I

Business Statistics

BMGT230 | Business Statistics | 3

or BMGT231

The following courses are approved substitutes for BMGT230:
- BIOM301
- CCJS200
- ECON230
- ECON321
- EDM451
- EPIB300
- EPIB315
- GEOS305
- HLTH300
- INST314
- PSYC200
- and SOCY201. The following courses are approved substitutes for BMGT231:
- BIOE372
- ENCE302
- ENEE324
- ENME392
- or STAT400.

Robotics and Autonomous Systems Minor (CMSC)

- MATH246: Differential Equations for Scientists and Engineers
- or ENES221: Dynamics

One of the following:

- CMSC131: Object-Oriented Programming I
- ENME202: Computing Fundamentals for Engineers
- ENAE202: Computing Fundamentals for Engineers
- ENEE150: Intermediate Programming Concepts for Engineers

A minimum grade of C- or better is required for all minor and all prerequisite courses. A maximum of 2 courses may be used to satisfy the requirements of both a major and a minor.

Robots and Autonomous Systems (RAS) Minor Prerequisites

Course | Title | Credits
--- | --- | ---
MATH246 | Differential Equations for Scientists and Engineers | 3

or ENES221: Dynamics

Required Courses

Course | Title | Credits
--- | --- | ---
ENME480 | Introduction to Robotics | 3

ENAE450: Robotics Programming

ENEE467: Robotics Project Laboratory

CMSC477: Robotics Perception and Planning

Supporting Math Course (Required. Select one course. Must be completed prior to enrollment in CMSC477)

Course | Title | Credits
--- | --- | ---
MATH240 | Introduction to Linear Algebra | 3

MATH340: Multivariable Calculus, Linear Algebra and Differential Equations I (Honors)

MATH341: Multivariable Calculus, Linear Algebra, Differential Equations II (Honors)

MATH461: Linear Algebra for Scientists and Engineers

ENEE290: Introduction to Differential Equations and Linear Algebra for Engineers

Electives (select two courses):

Course | Title | Credits
--- | --- | ---
ENME400 | Machine Design | 3

ENME410: Design Optimization

ENME413: Bio-Inspired Robotics

ENME435: Remote Sensing Instrumentation

ENME441: Mechatronics and the Internet of Things

ENME461: Control Systems Laboratory

ENME467: Engineering for Social Change

or ENES467: Engineering for Social Change

ENME444: Assistive Robotics

Effective Spring 2024, course requirements changed (published December 19, 2023).
Development, libraries and archives.

Mobile development, healthcare, law, entertainment, policy, smart-city and entrepreneurs, in such wide-ranging fields as user experience, become designers, planners, technology consultants, project managers, problem-solving and cross-disciplinary communication.

Laboratory classes in user-centered design, technology development, evaluation and assessment. Students participate in hands-on studio and to engage in rapid development and prototyping grounded by rapid which they must try solutions and fail first in order to succeed); and apply and expand their creativity; to develop a start-up mentality (in their efforts to use technology in the service of the greater good; to deploy and iterate on those solutions. InfoDesign supports students and information; to design solutions for those problems; and to realize, students to frame important problems at the intersection of people

The B.A. in Technology and Information Design (InfoDesign) teaches

Graduates may indicated below may result in dismissal from the program. Failure to complete both sets of benchmark courses within the timeline indicated below may result in dismissal from the program.

Students may waive this requirement if they complete the course for another minor or major.

1 Students may waive this requirement if they complete the course for another minor or major.

**Technology and Information Design Major**

**Under** Technology and Information Design Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/information-studies/technology-info-design-major/)

- Effective Spring 2024, the program description and course requirements changed (published December 19, 2023).

**Original**

See Technology and Information Design Major (https://academiccatalog.umd.edu/undergraduate/colleges-schools/information-studies/technology-info-design-major/)

**Change**

The B.A. in Technology and Information Design (InfoDesign) teaches students to frame important problems at the intersection of people and information; to design solutions for those problems; and to realize, deploy and iterate on those solutions. InfoDesign supports students in their efforts to use technology in the service of the greater good; to apply and expand their creativity; to develop a start-up mentality (in which they must try solutions and fail first in order to succeed); and to engage in rapid development and prototyping grounded by rapid evaluation and assessment. Students participate in hands-on studio and laboratory classes in user-centered design, technology development, problem-solving and cross-disciplinary communication. Graduates may become designers, planners, technology consultants, project managers, and entrepreneurs, in such wide-ranging fields as user experience, mobile development, healthcare, law, entertainment, policy, smart-city development, libraries and archives.

**Requirements**

**Course**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST104</td>
<td>Design Across Campus</td>
<td>3</td>
</tr>
<tr>
<td>INST126</td>
<td>Introduction to Programming for Information Science</td>
<td>3</td>
</tr>
<tr>
<td>IDEA258</td>
<td>Special Topics in Innovation (IDEA258A Becoming a Design Thinker: Tools and Mindsets for Innovation)</td>
<td>1</td>
</tr>
<tr>
<td>INST201</td>
<td>Introduction to Information Science</td>
<td>3</td>
</tr>
<tr>
<td>SOCY105</td>
<td>Introduction to Contemporary Social Problems</td>
<td>3</td>
</tr>
<tr>
<td>STAT100</td>
<td>Elementary Statistics and Probability</td>
<td>3</td>
</tr>
<tr>
<td>INST204</td>
<td>Designing Fair Systems</td>
<td>3</td>
</tr>
<tr>
<td>INST380</td>
<td>Technology and Information Design: Do Good Now or PLCY380 Innovation and Social Change: Do Good Now</td>
<td>3</td>
</tr>
<tr>
<td>INST367</td>
<td>Prototyping and Development Studio</td>
<td>3</td>
</tr>
<tr>
<td>INST406</td>
<td>Cross Disciplinary Communication Lab</td>
<td>3</td>
</tr>
<tr>
<td>INST454</td>
<td>(Modeling and Simulating Systemic Problems)</td>
<td>3</td>
</tr>
<tr>
<td>INST466</td>
<td>Technology, Culture, and Society</td>
<td>3</td>
</tr>
<tr>
<td>INST491</td>
<td>(Integrated Capstone for Technology and Information Design)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Major Electives** 18

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST311</td>
<td>Information Organization</td>
<td></td>
</tr>
<tr>
<td>INST352</td>
<td>Information User Needs and Assessment</td>
<td></td>
</tr>
<tr>
<td>INST366</td>
<td>Privacy, Security and Ethics for Big Data</td>
<td></td>
</tr>
<tr>
<td>INST401</td>
<td>Design and Human Disability and Aging</td>
<td></td>
</tr>
<tr>
<td>INST402</td>
<td>Designing Patient-Centered Technologies</td>
<td></td>
</tr>
<tr>
<td>INST404</td>
<td>(Youth Experience Design Studio)</td>
<td></td>
</tr>
<tr>
<td>INST405</td>
<td>Game Design</td>
<td></td>
</tr>
<tr>
<td>INST441</td>
<td>Information Ethics and Policy</td>
<td></td>
</tr>
<tr>
<td>INST460</td>
<td>(Video Games as Emergent Experiences)</td>
<td></td>
</tr>
<tr>
<td>INST463</td>
<td>Technology Socialprenuer (AI and Society)</td>
<td></td>
</tr>
</tbody>
</table>

Additional elective courses may be added to this list upon approval by the Technology and Information Design program committee.

**Total Credits** 55

**Benchmark courses (16 credits)**

Failure to complete both sets of benchmark courses within the timeline indicated below may result in dismissal from the program.

**Course**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST104</td>
<td>Design Across Campus</td>
<td>3</td>
</tr>
<tr>
<td>INST126</td>
<td>Introduction to Programming for Information Science</td>
<td>3</td>
</tr>
<tr>
<td>IDEA258</td>
<td>Special Topics in Innovation (IDEA258A Becoming a Design Thinker: Tools and Mindsets for Innovation)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Benchmark I**

The below courses must be completed with a C- of higher within the first two semesters of the program:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST104</td>
<td>Design Across Campus</td>
<td>3</td>
</tr>
<tr>
<td>INST126</td>
<td>Introduction to Programming for Information Science</td>
<td>3</td>
</tr>
<tr>
<td>IDEA258</td>
<td>Special Topics in Innovation (IDEA258A Becoming a Design Thinker: Tools and Mindsets for Innovation)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Benchmark II**
The below courses must be completed with a C- of higher within the first three semesters of the program:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST201</td>
<td>Introduction to Information Science</td>
<td>3</td>
</tr>
<tr>
<td>SOCY105</td>
<td>Introduction to Contemporary Social Problems</td>
<td>3</td>
</tr>
<tr>
<td>STAT100</td>
<td>Elementary Statistics and Probability</td>
<td>3</td>
</tr>
</tbody>
</table>