Department of Biology

Chair: Dr. Steven N. Austad

The Department of Biology has experienced faculty dedicated to research and teaching with interests ranging from the molecular to the ecological level. The broad expertise of our faculty allows diverse emphasis in cellular, molecular, developmental, environmental, and evolutionary biology, genetics and genomics, bioinformatics, healthy aging, marine, and organismal biology. Our faculty have been recognized by the University and by national and international biological organizations for their excellence in research and teaching.

The curriculum in biology provides general and specific courses for non-majors and prepares the major for graduate study in biology; the professional schools of human and veterinary medicine, dentistry, optometry, and allied health sciences. Additionally, the curriculum prepares the non-major and major students with the knowledge required for careers in secondary science education, environmental education, wildlife management in both the public and private sectors, and other careers dependent upon comprehension of biological sciences. The Department of Biology also has a well-established Honors curriculum for those students who excel in academics and wish to participate in biological research. This program allows students to conduct research under the mentorship of faculty in the Department of Biology or the School of Medicine, and to graduate with departmental honors. The department offers the following B.S. degrees in biology as well as a minor in biology:

1. Major in Biology – Integrative Biology Concentration
2. Major in Biology – Marine Science Concentration
3. Major in Biology – Molecular Biology Concentration

Grade Point Average (Majors and Minors)

A student must have at least a 2.0 average in all biology courses attempted and a 2.0 average in all biology courses taken at UAB. The current UAB course repeat policy will be used in calculating the grade point average.

Transfer Credit

Biology courses in which a grade of D is earned at another institution cannot be applied toward requirements for the major or minor. Students will not be given more credit (semester hours) toward the major or minor than awarded for equivalent courses at UAB, nor more than 8 semester hours of credit in any introductory sequence or combination of courses. Excess hours in these courses may, however, be applied as electives toward the 120 semester hours necessary to satisfy the general degree requirements.

A minimum of 9 semester hours in the major and 6 semester hours in the minor in biology must be taken at UAB.

Graduate Programs

The Department of Biology offers graduate study leading to the degrees of Master of Science (Plan I - thesis and Plan II - non-thesis) and Doctor of Philosophy. Further information may be found in the UAB Graduate School Catalog.

Accelerated Master of Science Programs

Fifth Year M.S. Program

The Department of Biology offers an opportunity to earn a B.S. and an M.S. degree in a total of five years through programs such as Early Acceptance (EA) and Accelerated Bachelors-to-Masters (ABM). This program offers qualified students mentorship during undergraduate study and supplements professional degrees such as medicine, veterinary sciences, dentistry, optometry, and physician assistant. The student works closely with a faculty member in an area of intensive research which prepares the student for a Ph.D. degree program in the biological sciences or a future health professions career. It also builds teaching skills for academic careers. Admission to the program requires a minimum 3.25 grade point average; three letters of recommendation; an interview with the admissions committee; and a satisfactory score on the Graduate Record Examination by fall of the senior year. For additional information, please contact Dr. Stephen Watts, Graduate Program Director, at (205) 934-2045 or sawatts@uab.edu.

Bachelor of Science with a Major in Biology

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong></td>
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<tr>
<td>MA 125 Calculus I</td>
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<tr>
<td>&amp; PH 202 College Physics II</td>
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<tr>
<td>PH 221 General Physics I</td>
<td></td>
</tr>
<tr>
<td>&amp; PH 222 General Physics II</td>
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<td><strong>Biology Requirement</strong></td>
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</tr>
<tr>
<td>Biology Majors must complete 40 hours of Biology courses approved for the major.</td>
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Introductory Biology & Freshmen Seminar

BY 120 Living Biology at UAB and Beyond - Seminar | 1
BY 123 Introductory Biology I | 4
BY 124 Introductory Biology II | 4

Genetics

BY 210 Genetics | 3
or BY 211 Genetics for Honors-HON

Ecology & Evolution

Select one of the following: | 3-4
Biology Majors must complete 40 hours in Biology (BY) courses approved for the major, including BY 123 and BY 124 with a C or better (fulfilling Core Curriculum Area III and the courses taken to satisfy the requirements below. Additional courses to total 40 semester hours selected after consultation with an advisor and consideration of interests and career goals. At least 9 hours must be 400-level or higher. No more than 6 total hours of BY 394, BY 397, BY 398, and BY 492 can be applied towards the 40 hours of Biology (BY) courses. Note: BY 101, BY 102, BY 108, BY 109, BY 111, BY 112, BY 116, BY 203 and BY 261 cannot be applied toward the Biology major.

**GPA Requirement & Residency**
A student must have at least a 2.0 average in all biology courses attempted and a 2.0 average in all biology courses taken at UAB in order to graduate. The current UAB course repeat policy will be used in calculating the grade point average. A minimum of nine semester hours in the major must be taken at UAB. Transfer students should be aware of the Department of Biology's policy regarding transfer credit.

**Additional Requirements**

**General Electives**
Students must take general electives to reach the 120 semester hour requirement.

**Graduating Seniors**
Students must take a biology major fields test and a departmental survey.

**Core Curriculum**
Students must take a Philosophy course that meets the QEP Ethics and Civic Responsibility Requirement, either PHL 115 or PHL 116.

**Bachelor of Science with a Major in Biology and a Marine Science Concentration**
The Marine science concentration and the molecular biology track prepare students for careers in marine science or research careers in the basic or medically-related sciences.

<table>
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<tr>
<th>Requirements</th>
<th>Hours</th>
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<tr>
<td><strong>Mathematics</strong></td>
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<tr>
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<tr>
<td>or CH 247 Organic Chemistry II HONORS</td>
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1. Note: Completion of MA 125 automatically satisfies the Core Curriculum Area III: Math requirement and the Biology Major Requirement.
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<td>Organic Chemistry II Laboratory (Honors)</td>
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<tr>
<td>CH 460</td>
<td>Fundamentals of Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>or CH 461</td>
<td>Advanced Biochemistry</td>
<td></td>
</tr>
</tbody>
</table>

**Physics**

Select one of the following: 8

- PH 201 College Physics I
  - & PH 202 College Physics II
- PH 221 General Physics I
  - & PH 222 General Physics II

**Marine Science Electives**

Select at least five Marine Environmental Science (MESC) courses approved for the academic advisor. 15

**Biology Requirements**

Biology majors must complete 40 hours in Biology (BY) or Marine Environmental Science (MESC) courses approved for the major. 2

**Introductory Biology and Freshmen Seminar**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tr>
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<tr>
<td>BY 123</td>
<td>Introductory Biology I</td>
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</tr>
<tr>
<td>BY 124</td>
<td>Introductory Biology II</td>
<td>4</td>
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</table>

**Genetics**

BY 210 Genetics or BY 211 Genetics for Honors-HON 3

**Ecology & Evolution**

Select one of the following: 3-4

- BY 468 Ecological Genetics
- BY 470 Ecology
- BY 407 Microbial Ecology
- BY 429 Evolution
- BY 474 Chemical Ecology
- BY 435 Natural History of Vertebrates
- BY 467 Population Ecology
- MESC 411 Coastal Wetlands Ecology
- MESC 412 Marine Ecology

**Organismal**

Select one of the following: 3-4

- BY 255 Invertebrate Zoology
- BY 256 Vertebrate Zoology
- BY 271 Biology of Microorganisms
- BY 351 Plant Biology
- BY 442 Experimental Phylology
- MESC 402 Marine Vertebrate Zoology
- MESC 407 Marine Botany
- MESC 413 Marine Invertebrate Zoology

**Physiology and Development**

Select one of the following: 3-4

- BY 314 Embryology
- BY 409 Principles of Human Physiology
- BY 405 Microbial Physiology
- BY 410 Comparative Animal Physiology
- BY 420 General Endocrinology
- BY 436 Biological Processes in Aging
- BY 440 Immunology
- BY 450 Plant Physiology
- BY 475 Comparative Developmental Biology

**Cellular/Molecular**

Select one of the following: 3

- BY 215 Introduction to Genomics
- BY 311 Molecular Genetics
- BY 330 Cell Biology
- BY 434 Functional Genetics and Systems Biology
- BY 414 Advanced Cell Biology
- BY 437 Epigenetics

**Capstone Experience**

Select one of the following (only one capstone course can count toward the major): 4

- BY 484 Bio Capstone: Chemical Ecology
- BY 490 Bio Capstone: Human Physiology
- BY 491 Biology Capstone - Evolution
- BY 492 Biology Capstone - Undergraduate Research
- BY 493 Biology Capstone - Honors Research

**Electives**

Electives in Biology to total 40 hours

**Total Hours**

74-77

1. Note: Completion of MA 125 automatically satisfies the Core Curriculum Area III: Math requirement and the Biology Major Requirement

2. These hours include BY 123 and BY 124 with a C or better (fulfilling in Core Curriculum Area III) and the courses taken to satisfy the requirements below. All of the courses listed below are approved for the major; consult your advisor for a list of additional courses. At least 9 hours must be 400-level or higher. No more than 6 total hours of BY 394, BY 397, BY 398, and BY 492 can be applied towards the 40 hours of Biology (BY) courses. Note: BY 101, BY 102, BY 108, BY 109, BY 111, BY 112, BY 116, BY 203 and BY 261 cannot be applied toward the Biology major.

**GPA Requirement & Residency**

A student must have at least a 2.0 average in all biology courses attempted and a 2.0 average in all biology courses taken at UAB in order to graduate. The current UAB course repeat policy will be used in calculating the grade point average. A minimum of nine semester hours in the major must be taken at UAB. Transfer students should be aware of the Department of Biology’s policy regarding transfer credit.

**Additional Requirements**

**General Electives**

Students must take general electives to reach the 120 semester hour requirement.

**Graduating Seniors**

Students must take a biology major fields test and a departmental survey.

**Core Curriculum**

Students must take a Philosophy course that meets the QEP Ethics and Civic Responsibility Requirement, either PHL 115 Contemporary Moral Issues or PHL 116 Bioethics.
Bachelor of Science with a Major in Biology and a Molecular Biology Concentration

### Requirements

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<tr>
<th>Mathematics</th>
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<td>or CH 248</td>
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<td>CH 460</td>
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<tr>
<td>or CH 461</td>
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</table>

### Chemistry

- **General Chemistry I**
- **General Chemistry I Laboratory**
- **General Chemistry II**
- **General Chemistry II Laboratory**
- **Organic Chemistry I**
- **Organic Chemistry I Laboratory**
- **Organic Chemistry II**
- **Organic Chemistry II Laboratory**
- **Fundamentals of Biochemistry**
- **Advanced Biochemistry**

### Physics

- **College Physics I**
- **College Physics II**
- **General Physics I**
- **General Physics II**

### Biology Requirements

- Majors must complete 40 hours in Biology courses.

### Introductory Biology & Freshmen Seminar

- **Living Biology at UAB and Beyond - Seminar**
- **Introductory Biology I**
- **Introductory Biology II**

### Required Molecular Track Courses

- **Genetics**
- **Genetics for Honors-HON**
- **Biological Data Interpretation and Analysis**
- **Biology of Microorganisms**
- **Molecular Genetics**
- **Cell Biology**

### Molecular Track Elective

Select four of the following:

- **Introduction to Genomics**
- **21st Century Gene Editing**
- **Advanced Cell Biology**
- **Cellular Physiology**
- **Principles of DNA Technology**
- **Advanced Molecular Genetics**
- **Functional Genomics and Systems Biology**
- **Epigenetics**
- **Immunology**
- **Biological Experimental Design and Methods**

### Capstone Experience

Select one of the following (only one capstone course can count towards major):

- **Bio Capstone: Chemical Ecology**
- **Bio Capstone: Human Physiology**
- **Biology Capstone - Evolution**
- **Biology Capstone - Undergraduate Research**
- **Biology Capstone - Honors Research**

### Elective Courses

Electives in Biology to total 40 hours.

### Total Hours

72

1. Note: Completion of MA 125 automatically satisfies the Core Curriculum Area III: Math requirement and the Biology Major Requirement.
2. Including BY 123 and BY 124 with a C or better (fulfilling Core Curriculum Area III) and the courses taken to satisfy the requirements below. All of the courses listed below are approved for the major; consult your advisor for a list of additional courses. At least 9 hours must be 400-level or higher. No more than 6 total hours of BY 394, BY 397, BY 398, and BY 492 can be applied towards the 40 hours of Biology (BY) courses. Note: BY 101, BY 102, BY 108, BY 109, BY 111, BY 112, BY 116, BY 203 and BY 261 cannot be applied toward the Biology major.

### GPA Requirement & Residency

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### Additional Requirements

#### General Electives

Students must take general electives to reach the 120 semester hour requirement.

#### Graduating Seniors

Students must take a biology major fields test and a departmental survey.

#### Core Curriculum

Students must take a Philosophy course that meets the QEP Ethics and Civic Responsibility Requirement, either PHL 115 or PHL 116.

### Proposed Program of Study for a Major in Biology

#### Freshman

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<th>First Term</th>
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<th>Hours</th>
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### Proposed Program of Study for a Major in Biology with a Concentration in Marine Science

#### Freshman

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<th>Hour</th>
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<td>MA 106</td>
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<td>MA 125</td>
<td>4</td>
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<td>EH 102</td>
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#### Sophomore

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<td>Capstone Experience</td>
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#### Senior

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<th>Hour</th>
<th>Summer Term</th>
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<tr>
<td>Physiology</td>
<td>3-4</td>
<td>Capstone Experience</td>
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<td>Biology Elective</td>
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<td>3 BY 490, 491, or 492</td>
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<tr>
<td>Ecology (if not covered with MESC)</td>
<td>3</td>
<td>Add BY 484 Bio Capstone: Chemical Ecology</td>
<td>12-13</td>
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<tr>
<td>Core Curriculum Area II or Area IV</td>
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<td>Core Curriculum Area II or Area IV</td>
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</table>
BY 101, BY 102, BY 111, BY 112, BY 116, BY 203 and BY 261 do not count toward Biology Electives.

Must earn Biology GPA of at least 2.0

See Biology Advisor once each term.

Some Biology (BY) courses rotate every other year or once a year, see advisor.

18 hours Marine Science (MESC) courses (taken summers at sea lab) contribute to 40 hours in Biology.

Proposed Program of Study for a Major in Biology with a Concentration in Molecular Biology

Biology Elective (see note below)

CH 460 or 461

BY 440 or 436

BY 433 or 414

First Term

<table>
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<tr>
<th>Hours</th>
<th>Freshman Year Experience</th>
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<td>1</td>
<td>CAS Freshman Year Experience</td>
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| Area III: Natural Sciences requirement; check the Core Curriculum for your particular major. |
| Core Curriculum Area II or Area IV |

Note: Some Biology (BY) courses rotate every other year, see advisor.

Biochemistry - CH 460 is taught summer and fall. CH 461 is only offered in the fall.

Minor in Biology

Required Biology Courses (must earn a grade of C or better)

BY 123 Introductory Biology I

BY 124 Introductory Biology II

BY 210 Genetics

Select 6 hours from 200-level or higher Biology (BY) courses.

Total Hours: 17

Note: BY 123 and BY 124 may also satisfy the Core Curriculum Area III: Natural Sciences requirement; check the Core Curriculum for your particular major.

Not more than a total of three hours in BY 397, BY 398, and BY 498 may be counted toward the minor.

Note: BY 101, BY 102, BY 108, BY 109, BY 111, BY 112, BY 116, and BY 261 cannot be applied toward the Biology minor.

GPA Requirement & Residency

A student must have at least a 2.0 average in all biology courses attempted and a 2.0 average in all biology courses taken at UAB in order to graduate. The current UAB course repeat policy will be used in calculating the grade point average. A minimum of six semester hours in the minor must be taken at UAB. Transfer students should be aware of the Department of Biology's policy regarding transfer credit.

Honors Program in Biology

Purpose

The Biology Honors Program offers motivated students the opportunity to develop research and communication skills in preparation for a graduate or professional career.
Eligibility
To be accepted into the Biology Honors Program, a student must:

- Have Junior Standing (64 hrs).
- Have earned a 3.5 GPA in biology courses attempted.
- Have earned a 3.0 GPA overall.
- Have completed 18 semester hours in biology courses.
- Have enrolled in BY 398 (Undergraduate Research) for at least one semester hour.
- Have arranged with a faculty sponsor in biology to do a research project.

Requirements
Students in the Biology Honors Program will be required to have the following:

- Six semester hours in BY 498 (Honors Research) and/or BY 493 (Honors Capstone Research) with each semester hour per term requiring a minimum of four hours of laboratory work per week.
- A formal research proposal, submitted by the end of the first semester of Honors Research, including an introduction, proposed methods, and relevant literature citation.
- A formal written report in the form of a scientific paper.
- An oral or poster presentation at Biology Research Day or the UAB Expo.

In some instances, it will be recommended that Biology Honors students give a formal presentation of their work at a scientific meeting. Funds may be provided to support participation at such a meeting.

Benefits
In addition to the educational and career benefits of participation in the Biology Honors Program, students who complete the program will be honored at the annual Biology Honors Research Day and will graduate “With Honors in Biology.”

Contact
For more information and/or admission to the Biology Honors Program, contact Dr. Thane Wibbels, Campbell Hall, Room 255A, Birmingham, AL 35294-1170; Telephone (205) 934-4419 or E-mail twibbels@uab.edu

BY-Biology Courses

BY 101. Topics in Contemporary Biology. 3 Hours.
Selected topics in the current understanding of biological systems, ranging from humans to ecosystems. Particular focus on scientific issues such as human diseases, genetic engineering, emerging infectious diseases, environmental causes of disease, and climate change, as well as analysis of these issues as presented in print and electronic media. NOTE: Not for biology majors or minors (with BY 102). This course, when taken with its corresponding laboratory, meets the Core Curriculum requirements for Area III: Natural Sciences.

BY 102. Topics Contemporary Biology Laboratory. 1 Hour.
Experiments and demonstrations in contemporary biology with strong emphasis is placed on understanding the systems of the human body. Drawing and writing assignments will focus on the structure and function of the important systems of the human body. Quantitative Literacy is a significant component of this course.

BY 108. Human Population and the Earth’s Environment. 3 Hours.
Influence of human population on Earth’s environment. Specific attention will be paid to environmental issues such as population growth, climate change, water and energy resources, pollution, waste disposal, plant and animal extinctions, and food resources. Strong emphasis will be placed on determining solution to the variety of environmental problems facing the earth. Lecture and film. Ethics and Civic Responsibility are significant components of this course.

BY 109. Laboratory in Environmental Science. 1 Hour.
Experiments on topics essential to study of environment and which reveal complexity of solving environmental problems. Writing, Ethics and Civic Responsibility are significant components of this course.

Prerequisites: BY 108 [Min Grade: D] (Can be taken Concurrently) or BY 108 [Min Grade: P] or ENV 108 [Min Grade: D] (Can be taken Concurrently) or ENV 108 [Min Grade: P](Can be taken Concurrently)

BY 111. Extended Topics in Contemporary Biology. 3 Hours.
Selected topics in contemporary biology of interest to students with minimal background in biology. Topics presented in interactive lecture/discussion format. This course, when taken with its corresponding laboratory, meets the Core Curriculum requirements for Area III: Natural Sciences. NOTE: Only general elective credit for biology major or minor.

Prerequisites: BY 101 [Min Grade: D]

BY 112. Ext Topics Contemporary Biology Laboratory. 1 Hour.
Further examination, interpretation, and discussion of topics in BY 111, Independent and group projects. NOTE: Only general elective credit for biology major or minor.

Prerequisites: BY 111 [Min Grade: D](Can be taken Concurrently)

BY 115. Human Anatomy. 4 Hours.
Principles of vertebrate structure with emphasis on gross and microscopic human anatomy. Survey of human embryology and evolution. Lecture and laboratory.

BY 115L. Human Anatomy Laboratory. 0 Hours.
Human Anatomy Lab required with BY 115 lecture.

BY 116. Introductory Human Physiology. 4 Hours.
Integrated functions of human cells, tissues, and organ systems. NOTE: Only general elective credit for biology majors or minors. Lecture and laboratory.

Prerequisites: BY 115 [Min Grade: C] and (CH 105 [Min Grade: C] and CH 106 [Min Grade: C]) or (CH 115 [Min Grade: C] and CH 116 [Min Grade: C]) or CH 114 [Min Grade: C] or (CH 117 [Min Grade: C] and CH 118 [Min Grade: C] or CH 119 [Min Grade: C]) and BY 116L [Min Grade: C](Can be taken Concurrently)

BY 116L. Introductory Human Physiology Laboratory. 0 Hours.
Human Physiology Lab required with BY 116 lecture.

Prerequisites: BY 116 [Min Grade: C](Can be taken Concurrently)

BY 120. Living Biology at UAB and Beyond - Seminar. 1 Hour.
Living Biology at UAB and Beyond is a seminar for Biology freshmen students jointly taught by the Biology research faculty members. LivBio has two primary goals: 1) introduce students to the people, projects, and opportunities in the Biology Department at UAB, 2) foster and cultivate student STEM identities and interests to help them succeed in Biology at UAB (and beyond). Students will engage in active research talks from Professors, learn about novel research technologies, read and discuss breaking news in biological discoveries, and more.
BY 123. Introductory Biology I. 4 Hours.
Basic chemistry, cell structure and function, metabolism, genetics, evolution, bacteria, and protists. For major in biology and related fields. Quantitative Literacy and Writing are significant components of this course. Lecture and laboratory. Enrolled in, or have completed MA 106, MA 107, MA 125, or MA 126. This course meets the Core Curriculum requirements for Area III: Natural Sciences.
Prerequisites: MA 106 [Min Grade: C] or MA 107 [Min Grade: C] or MA 125 [Min Grade: C] or MA 225 [Min Grade: C] or MA 126 [Min Grade: C] (Can be taken Concurrently) or MA 226 [Min Grade: C] (Can be taken Concurrently) or MAC 17 or MAAD 24 or MTH 75 or MTH 75 75 or MPL 61

BY 123L. Introductory Biology I Laboratory. 0 Hours.
Introductory Biology I Lab required with BY 123 lecture.

BY 124. Introductory Biology II. 4 Hours.
The course emphasizes the transition from cell, to tissue, to organs in multicellular systems. Specific attention in the course will be paid to a survey of the various groups of plants, fungi, invertebrates and vertebrates. Strong emphasis will be placed on comparing the anatomy and physiology of the major organ systems in humans with those of other organisms. The course is designed to expand the students understanding of the process of scientific writing. Quantitative Literacy and Writing are significant components of this course. This course meets the Core Curriculum requirements for Area III: Natural Sciences.
Prerequisites: BY 123 [Min Grade: C]

BY 124L. Introductory Biology II Laboratory. 0 Hours.
Introductory Biology II Lab required with BY 124 lecture.

BY 170. Biology of Sex. 3 Hours.
This course will cover the overwhelming diversity generated by sex. We will survey molecular, physiological, ecological, and evolutionary concepts that help us understand what sex is and what it is not. Students will write weekly blog posts and learn how to read the scientific literature. Students will explore scientific methods and learn how to translate scientific literature into lay terms, allowing creativity and enhancing critical thinking and reasoning skills.

BY 201. Climate Change and the Environment. 3 Hours.
This introductory course will introduce the science of climate change and is designed for science and non-science majors. We will discuss the empirically driven principles of anthropogenic climate change and why we have high certainty that humans have caused this rapid global change. Next, we will address the ecological consequences of a changing climate. We will cover examples from various environments including polar, terrestrial, and ocean ecosystems and study microbial, plant, and animal interactions. Finally, we will discuss potential solutions to reduce the impact of humans on climate change. This will include local, regional and worldwide strategies. Lecture. 3 credit hours.

BY 203. Aging: From Cells to Society. 3 Hours.
Americans born in the 21st century can expect to live 100 years or more. That is what some prominent aging researchers believe. Already, we are living longer than at any time in human history. Does that mean that society can expect to be overwhelmed by Alzheimer’s disease and other diseases of later life as the century progresses? Why do we age anyway? What goes wrong inside our body as we grow older? Why does it happen 5 times as fast in a dog? 30 times as fast in a mouse? What are the prospects for an aging “breakthrough” that might allow us to live much, much longer? What would be the societal impact of such a breakthrough? BY 203 is a course directed to non-majors that will address these and other questions, providing a solid background in the biology of aging, and the social implications of this biology in a rapidly changing world.

BY 210. Genetics. 3 Hours.
Principles and mechanisms of inheritance; structure, action, and regulation of genes; molecular genetic technology and application to human health and agriculture. Preparation for advanced courses in biology.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 211. Genetics for Honors-HON. 3 Hours.
Genetics, a study of heredity, refers to the understanding of how DNA and its products participate in diverse biological processes, molecular pathways and signaling cascades in both prokaryotes and eukaryotes. This CURE-based course is designed to increase student engagement and therefore student learning in this complex but very important discipline of biology hands-on training on a variety of topics. Lecture/lab.
3 credit hours.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 212. Genetics for Biomedical Engineers. 3 Hours.
Principles and mechanisms of inheritance; structure, action, and regulation of genes; molecular genetic technology and application to human health and agriculture. Preparation for advanced courses in biology. Enrollment in BY 212L required with BY 212 lecture.
Prerequisites: BY 123 [Min Grade: C]

BY 212L. Genetics for Biomedical Engineers - Laboratory. 1 Hour.
Genetics for BME - Laboratory is required with BY 212 lecture.
Prerequisites: BY 123 [Min Grade: C]

BY 215. Introduction to Genomics. 3 Hours.
This course will feature basic and introductory concepts in –omics, sequencing technologies, applications in prokaryotes and eukaryotes, particularly human genome. Moreover, we will also discuss how the next generation sequencing information can be applicable to human health, agriculture and ecology. Key concepts of computing and data science will also be introduced. This will also include basic bioinformatics and bioinformatics tools in handling and management of genomic data.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 216. Pathophysiology. 3 Hours.
A course about human diseases emphasizing mechanisms of injury, altered physiology, disease development and progress, clinical assessments, and treatment strategies. Specific topics include diseases on genetic defects, infections, cancers, stress, altered immune actions, nutritional problems, fluid imbalances, hormone control issues, altered blood flow, and pulmonary inadequacies. The course incorporates historical and current case load relevancy and case study analysis.
Prerequisites: BY 116 [Min Grade: C] or BY 409 [Min Grade: C] or BY 124 [Min Grade: C]
BY 220. CLOne: Chromatin Laboratory 1. 0-4 Hours.
Students will learn laboratory skills in molecular genetics, with a
focuses on generating CRISPR guide RNAs and testing their efficiency
in Drosophila cells. The students will be introduced to the scope of
the project, read relevant literature, and will conclude their research
experience by writing a journal-style report on their results.
Prerequisites: BY 123 [Min Grade: C]

BY 245. Biological Data Interpretation and Analysis. 3 Hours.
The course covers the basics of scientific investigation with an emphasis
on understanding what science is, the methods of the scientific process,
experimental design, data analysis and interpretation, graphical
presentation, and scientific writing. Special emphasis will be placed on
the understanding of statistical language and the most common types
of data analyses used in biology. Quantitative Literacy is a significant
component of this course. Recommend course is taken before junior
year.
Prerequisites: BY 124 [Min Grade: C]

BY 254. Comparative Vertebrate Zoology. 4 Hours.
Comparative approach to the structure, function, ecology, life history,
and conservation of vertebrates. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C] and (CH 115 [Min Grade: C] and
(CH 116 [Min Grade: C] or CH 114 [Min Grade: C])
BY 254L. Vertebrate Zoology Laboratory. 0 Hours.
Vertebrate Zoology Lab required with BY 254 lecture.

BY 256. Vertebrate Zoology. 4 Hours.
Comparative approach to the structure, function, ecology, life history,
and conservation of vertebrates. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C] and CH 115 [Min Grade: C] and
(CH 116 [Min Grade: C] or CH 114 [Min Grade: C])

BY 256L. Vertebrate Zoology Laboratory. 0 Hours.
Vertebrate Zoology Lab required with BY 256 lecture.

BY 261. Introduction to Microbiology. 4 Hours.
Cell structure and function, microbial genetics, viruses, and epidemiology
and infectious disease. NOTE: Cannot be applied toward requirements
for a biology major. Lecture and laboratory.
Prerequisites: BY 123 [Min Grade: C] or (CH 107 [Min Grade: C] and
CH 108 [Min Grade: C] or (CH 237 [Min Grade: C] and CH 238 [Min
Grade: C]) or (CH 237 [Min Grade: C] and CH 239 [Min Grade: C]) and
BY 116 [Min Grade: C]
BY 261L. Introduction to Microbiology Laboratory. 0 Hours.
Introduction to Microbiology Lab required with BY 261 lecture.

BY 267. Tropical Ecology. 3 Hours.
Major tropical ecoregions; ecology of terrestrial, aquatic, and marine
tropical organisms. Major portion conducted at tropical field station
in Caribbean. Lecture and field trips (May session, alternate years).
Permission of Instructor required.
Prerequisites: BY 124 [Min Grade: C]

BY 268. Galapagos Ecology. 3 Hours.
An overview of the ecology of the Galapagos Island, with an emphasis on
the ecology of terrestrial and marine organisms. Major portion of course
conducted on the Galapagos Islands. Lecture & field trips. Permission of
instructor required.
Prerequisites: BY 124 [Min Grade: C]

BY 269. Rain Forest Ecology. 3 Hours.
Physical and environmental factors that structure rain forest, biodiversity
of life, and interactions of its organisms. Prominent biota. Major portion of
course taught at tropical field station in Costa Rica. Lecture and field trips
(May session, alternate years). Permission of instructor required.
Prerequisites: BY 124 [Min Grade: D]

BY 271. Biology of Microorganisms. 4 Hours.
Microbiology with emphasis on molecular aspects of microbial cell
structure, function, and diversity. Host defense mechanisms, infectious
disease, and microbial ecology. Preparation for advanced courses in
biology. Lecture and laboratory.
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and
CH 117 [Min Grade: C] and (CH 118 [Min Grade: C] or CH 119 [Min
Grade: C])
BY 271L. Biology of Microorganisms Laboratory. 0 Hours.
Biology of Microorganisms Lab required with BY 271 lecture.

BY 285. Biology Career Readiness Seminar. 1 Hour.
This course is designed to prepare biology majors for a career after
graduation. In order to develop the skills and habits needed to succeed
professionally, we will investigate what it means to be a professional in
biology and look at strategies needed for success. Topics covered will
be career exploration, networking, personal branding, career planning,
strategic career search, interviewing techniques, and professional
etiquette. In addition to these topics which are important for all career
paths, strategies for applying to graduate and professional school will be
surveyed.

BY 286. Research Skills Seminar. 1 Hour.
This course will provide an introduction to undergraduate research
students joining the UAB Department of Biology. The course will guide
the students through the process of joining a research lab and prepare
them to begin a mentored undergraduate research experience in the
following semester. While this course is open to all biology majors,
it particularly focused on reaching transfer students to facilitate their
engagement in undergraduate research.

BY 311. Molecular Genetics. 3 Hours.
Prokaryotic and eukaryotic gene structure and function.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 314. Embryology. 3 Hours.
Descriptive and experimental studies of vertebrate development at the
molecular, cellular and tissue levels.
Prerequisites: CH 117 [Min Grade: C] and CH 118 [Min Grade: C]

BY 327. Histology. 4 Hours.
Microscopic anatomy of cells, tissues, and organs of animals; correlation
of structure and function. Techniques and methodology. Lecture and
laboratory.
Prerequisites: BY 115 [Min Grade: C] or BY 124 [Min Grade: C]

BY 327L. Histology Laboratory. 0 Hours.
Histology Lab required with BY 327 lecture.
BY 330. Cell Biology. 3 Hours.
Structure and function of the cell, cellular components and major cellular processes. Topics include biological molecules and metabolism, energetics, synthesis and regulation of macromolecules, mechanisms for transcription and translation, membranes and organelles, small molecule transport and intracellular trafficking, cytoskeleton and cell movement, cell signaling, cell cycle, and cancer cell biology.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and CH 235 [Min Grade: C](Can be taken Concurrently) and CH 234 [Min Grade: C](Can be taken Concurrently) or CH 236 [Min Grade: C](Can be taken Concurrently)

BY 340. Animal Nutrition. 3 Hours.
This course is designed for the study of comparative animal nutrition, and is targeted for biology majors with interest in Veterinary and Medical Schools. Topics include: 1. the classification and function of nutrients, 2. the anatomy, physiology and biochemistry of the gastrointestinal system, 3. nutrient procurement, 4. methods of analysis for nutrients and feed, and 5. feed formulation and manufacture.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BY 210 [Min Grade: C]

BY 351. Plant Biology. 3 Hours.
This course introduces the student to the basic concepts of plant biology including plant diversity, structure, physiology, metabolism, reproduction, genetics, molecular biology, evolution and ecology. It is targeted to Biology Majors. This class brings together knowledge and methodologies from a number of different disciplines to provide students with an intensive and comprehensive plant curriculum from the molecular to the organismal level. In this course, students will be introduced not only to plant biology, but also to plant-specific concepts and techniques in molecular biology and genetics. Lecture. 3 credit hours.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 354. Field Phycology. 4 Hours.
Students will be introduced to freshwater and marine phycology, with an emphasis on evolutionary ecology. A major portion of the course will be based in the field along the Eastern Shore of Virginia and throughout the freshwater habitats of Alabama. Lecture, laboratory, and field trips (May session). Permission of Instructor required.
Prerequisites: BY 123 [Min Grade: C] or BY 124 [Min Grade: C] or BY 210 [Min Grade: C]

BY 362. Neurobiology. 3 Hours.
This course teaches the biological basis of nervous system function, i.e., how the central nervous system is organized, and how neurons, synapses and neuronal circuits function in order to produce behavior. The course also provides the student with basic concepts in mammalian neuroendocrinology and age-related changes in nervous system structure and function.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 394. Biology Laboratory Teaching. 1-6 Hour.
Student will assist in instruction of a biology laboratory. Student is required to attend scheduled preparatory sessions each week, assist in teach assigned laboratory section, help develop student assignments such as examinations and/or practicals and assist the laboratory coordinator in other capacities as assigned. Students work under the direction of the course instructor and/or the laboratory coordinator. Student must have completed the course in which the student is assisting with a grade of B or higher. Permission of the instructor is required. May be repeated for credit to a maximum of six semester hours.

BY 395. Special Topics in Biology. 1-4 Hour.
This course will consider topics from the various disciplines in the biological sciences and the topic will differ each term. Course requirements may include lecture, laboratory, readings, discussion, reporting, and internships or fieldwork, which may be conducted on- or off-campus. May be taken more than once for credit.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 397. Advanced Directed Readings. 1-3 Hour.
Reading and independent study in selected areas under supervision of faculty sponsor. May be repeated for total of three semester hours credit. 12 semester hours of BY with BY GPA of 3.0 and permission of instructor required.

BY 398. Undergraduate Research. 1-3 Hour.
Research project under supervision of faculty sponsor. May be repeated for a total of 3 semester hours credit. 12 semester hours of BY with GPA of 3.0 and permission of instructor required.

BY 405. Microbial Physiology. 3 Hours.
Microbial structure and function, growth, metabolism, and regulation of cellular activity.
Prerequisites: BY 271 [Min Grade: C]

BY 407. Microbial Ecology. 3 Hours.
This course examines microorganisms in their natural habitats, with a focus on soil and aquatic ecosystems as well as symbiotic interactions between microbes and animals and plants. Students will learn both theory and practical techniques for studying microbial ecology, including hands-on exposure to modern bioinformatic analysis methods for microbial communities. 3 credit hours.
Prerequisites: BY 271 [Min Grade: C]

BY 409. Principles of Human Physiology. 4 Hours.
The lecture and laboratory course uses humans as a model system to investigate physiological processes occurring at cell, tissue, organ, and system levels. Additionally the use of experimental examples and laboratory experiments and the interpretation of data will be used to understand all aspects of productivity. The class is designed to improve scientific writing skills related to research experiment. Writing and Quantitative Literacy are significant components of this course. Foundation in anatomy recommended (BY 115 or BY 256).
Prerequisites: [BY 210 [Min Grade: C] or BY 211 [Min Grade: C] and CH 237 [Min Grade: C] and (CH 238 [Min Grade: C] or CH 239 [Min Grade: C])]

BY 409L. Principles of Human Physiology Laboratory. 0 Hours.
Human Physiology Lab required with BY 408 and BY 409 lecture.

BY 410. Comparative Animal Physiology. 3 Hours.
Comparative examples to illustrate general principles of physiology; study of how animals function in their environment.
Prerequisites: BY 256 [Min Grade: C]

BY 411. Advanced Human Anatomy. 4 Hours.
Regional study of human gross anatomy by dissection of human donor bodies.
Prerequisites: BY 115 [Min Grade: C]
BY 412. 21st Century Gene Editing. 3 Hours.
The course will cover basic concepts of molecular genetics, including an introduction to the DNA biology (structure and function), the use of model organisms and experimental approaches for molecular genetic analysis and an understanding of human genetic disorders and possible genetic therapies. The first part of the course, while dealing with introductory material through lectures and discussions, will give students a hands-on experience with well-known molecular techniques like DNA isolation and polymerase chain reaction (PCR), and how these techniques are used in the context of gene editing. The participants will also have direct exposure to working with zebrafish (Danio rerio) embryos (<3 days old, therefore exempt from detailed IACUC regulations) and roundworms (C. elegans) as an alternate model system to use the CRISPR-Cas9 technology. These broadly applicable techniques will be reiterated in the second part of the course with a special emphasis on the CRISPR-Cas9 technology. The activities involved in these two parts will provide an opportunity for rich discussion on fundamental concepts in biology and chemistry, the process of scientific experimentation, and the nature of evidence.
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and CH 235 [Min Grade: C](Can be taken Concurrently) and CH 236 [Min Grade: C](Can be taken Concurrently)

BY 414. Advanced Cell Biology. 3 Hours.
This course will focus on understanding cell signaling, function, and dynamics, which is the core of modern cell biology topics. This course is targeted for senior undergraduate students who are interested in current topics of Cell Biology and have successfully completed undergraduate courses in genetics and cell biology. Topics include the cellular organization and function, cell cycle, autophagy, apoptosis, stem cell and cellular signaling pathways. This course also includes reading of primary literature and writing a research proposal.
Prerequisites: BY 210 [Min Grade: C] and BY 330 [Min Grade: C]

BY 416. Cellular Physiology. 3 Hours.
Biochemical and thermodynamic aspects of cellular energy metabolism. Foundation in physiology recommended (BY 124, BY 116, BY 409 or BY 410).
Prerequisites: BY 330 [Min Grade: C] and CH 237 [Min Grade: C] (Can be taken Concurrently) and CH 238 [Min Grade: C](Can be taken Concurrently) or CH 239 [Min Grade: C]

BY 420. General Endocrinology. 3 Hours.
The central theme of this course is the role of hormone chemical messengers in the regulation of physiological processes. Topics include structure of endocrine cells and glands, hormone synthesis and chemistry, physiological effects of hormones, and mechanisms of hormone action. Emphasis is placed on vertebrate systems, but instructive invertebrate systems are also considered.
Prerequisites: BY 256 [Min Grade: C]

BY 426. Evolutionary Medicine. 3 Hours.
An evolutionary approach to issues relating to human health and disease.
Prerequisites: (BY 116 [Min Grade: C] or BY 409 [Min Grade: C]) and BY 330 [Min Grade: C]

BY 429. Evolution. 3 Hours.
The course includes the history of evolutionary thought and modern evolutionary theory. Discussions cover (but are not limited to) the history of life, mechanisms of evolutionary change, sexual selection, adaptation, speciation, and molecular evolution. Students will also be introduced to historical and contemporary studies of evolution on a wide variety of topics and organisms.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 431. Principles of DNA Technology. 3 Hours.
Manipulation of genes and their regulation; techniques used in recombinant DNA technology. Lecture.
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and BY 311 [Min Grade: C]

BY 433. Advanced Molecular Genetics. 3 Hours.
Molecular genetics of eukaryotic organisms, including analysis of the features and nature of eukaryotic genomes, genes, nucleosomes, and chromosomes; processes involved, such as transcription, splicing, transposition, and signal transduction. The role of molecular biology in cell growth and cancer. Lecture.
Prerequisites: BY 311 [Min Grade: C]

BY 434. Functional Genomics and Systems Biology. 3 Hours.
Systems biology is an inter-disciplinary study underlying complex biological processes as integrated systems of many interacting components. This course will give students a foundation in understanding complex biological interactions at the molecular, network and genomic level. This course will cover state-of-the-art high throughput established and novel approaches used in genome sequencing, transcriptomics, proteomics and metabolomics to obtain, integrate and analyze complex data. The students will also get familiar with knowledge on experimental perturbation of genomes, gene regulatory networks, comparative genomics and evolution, basic bioinformatics. This course will be a combination of text based lectures and discussions of the current literature relevant to Functional Genomics and Systems Biology.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 435. Natural History of Vertebrates. 4 Hours.
Lecture and field study of adaptations of vertebrate classes for survival in particular environments. Survey and classification of local vertebrates. Lecture and laboratory.
Prerequisites: BY 256 [Min Grade: C]

BY 435L. Natural History of Vertebrates Laboratory. 0 Hours.
Natural History of the Vertebrates Lab required with BY 435 lecture.

BY 436. Biological Processes in Aging. 3 Hours.
The #1 threat to human health – far greater than cancer, heart disease, and Alzheimer’s disease combined – is aging. Aging is also a fascinating biological puzzle. Why do we, and virtually every other species, age in the first place? Why can’t nature simply maintain the body it built? This course will introduce you to the fascinating process of biological aging, its impact on human and animal life, how it evolved, and the manner in which its biology is investigated, the cellular and molecular process that underlie aging, and how efforts to slow human aging are progressing. We will cover the history of exceptionally long human and animal lives and also delve into current and historical approaches to alter the rate of aging in humans with an emphasis on current promising research areas. In covering this material we will also encounter some of the many colorful scientists who have worked on the problem of aging as well as the past and current frauds and charlatans who are just trying to make a buck off of people’s fear of death and disability.
Prerequisites: BY 123 [Min Grade: C] and BY 210 [Min Grade: C]
BY 437. Epigenetics. 3 Hours.
This course provides a survey of the field of epigenetics, introducing the student to the diverse areas of epigenetic research in a variety of eukaryotic systems. The course combines lectures with discussion of primary literature and research talks from invited faculty speakers working in epigenetics. In addition to providing an overview of the field of epigenetics, this course emphasizes working with primary scientific literature and the development of critical reading skills. Recommended that Molecular Genetics be completed prior to enrollment.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 440. Immunology. 3 Hours.
Immunne system and functions of host humoral and cellular immune responses. Mechanisms of antigen and antibody reactions and basic immunological methods.
Prerequisites: BY 271 [Min Grade: C] and BY 330 [Min Grade: C]

BY 442. Experimental Phycology. 4 Hours.
The course uses Algae as a model system to investigate various experimental approaches to assessing productivity with specific emphasis placed on classification, respiration, photosynthesis, growth and nutrient limitation. Additionally the use of experimental examples and laboratory experiments and the interpretation of data will be used to understand all aspects of productivity. Designed to improve scientific writing skills related to research experiments. Quantitative Literacy is a significant component of this course.
Prerequisites: BY 124 [Min Grade: C] and CH 117 [Min Grade: C] and (CH 118 [Min Grade: C] or CH 119 [Min Grade: C])

BY 442L. Experimental Phycology Laboratory. 0 Hours.
Experimental Phycology Lab required with BY 442 lecture.
Prerequisites: BY 124 [Min Grade: C] and CH 117 [Min Grade: C] and (CH 118 [Min Grade: C] or CH 119 [Min Grade: C])

BY 444. Biological Experimental Design and Methods. 3 Hours.
This course focuses on modern experimental design and its use in biological research. Specifically, we will discuss principles of open science and their implications for data management as they apply to commonly used methods in biological research. We will discuss experimental design, the use of appropriate controls, and the interpretations of the results obtained. Methods covered in detail will include for example PCR, DNA sequencing (Sanger and NGS), fluorescent microscopy, and bioinformatics.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C] and BY 245 [Min Grade: C]

BY 450. Plant Physiology. 3 Hours.
Metabolic activities and growth processes of plants, with emphasis on photosynthesis, respiration, germination, dormancy, and hormones; physiological phenomena associated with phases of development. Lecture.
Prerequisites: CH 210 [Min Grade: C]

BY 454. Bio Capstone: Field Phycology. 4 Hours.
Students will be introduced to freshwater and marine phycology, with an emphasis on evolutionary ecology. A major portion of the course will be based in the field along the Eastern Shore of Virginia and throughout the freshwater habitats of Alabama. Lecture, laboratory, and field trips (May session). Permission of Instructor required. Students who enroll in this class as their capstone experience are expected to do writing and ethics assignments to fulfill their capstone requirements.
Prerequisites: BY 123 [Min Grade: C] or BY 124 [Min Grade: C] or BY 210 [Min Grade: C]

BY 456. Comparative Vertebrate Anatomy. 4 Hours.
Study of the anatomical systems of vertebrates in an evolutionary and functional context. Covers form, function, development and phylogeny of vertebrates, with overviews of organ systems, and the major adaptive events of vertebrate evolution. Labs complement lectures with dissections of representative species, and surveys of specializations in other forms. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C]

BY 456L. Comparative Vertebrate Anatomy Lab. 0 Hours.
Comparative Vertebrate Anatomy Lab required with BY 456 lecture.
Prerequisites: BY 124 [Min Grade: C]

BY 460. Advanced Invertebrate Zoology. 3 Hours.
This course takes an in-depth look at aspects of the biology of the Echinodermata and Crustacea. The course format includes lectures, guest lectures, and student critiques of papers from the scientific literature. There is a field trip to Blunt Springs to search for echinoderm fossils. Lecture and student projects.
Prerequisites: BY 255 [Min Grade: C]

BY 467. Population Ecology. 3 Hours.
The course covers the structure and dynamics of populations with an emphasis on understanding how reproduction, mortality and dispersal interact to control fluctuations in population size and structure. Special emphasis will be placed on the use of computer models and interpretation of data to address specific applications in conservation biology and natural resource management. Quantitative Literacy is a significant component of this course.
Prerequisites: BY 124 [Min Grade: C]

BY 468. Ecological Genetics. 3 Hours.
This intensive course will introduce students to the genetic tools of modern population biology – which ones are available, practical, and useful for particular questions – and how these genetic analyses have been applied to a wide variety of ecological topics, including: dispersal, life histories, recruitment, habitat and mate choice, local selection, genetic differentiation, the conservation of biodiversity, and speciation. Importantly, this course is an opportunity to become proficient at applying molecular tools to bolster ecological studies. Time will be spent in lectures and learning practical coding and data analyses.
Prerequisites: BY 210 [Min Grade: C]

BY 470. Ecology. 3 Hours.
The study of interactions between organisms and their environment. An introduction to ecological processes at individual, population, community, and ecosystem levels and their relevance to current environmental problems. Lecture.
Prerequisites: BY 255 [Min Grade: C] or BY 256 [Min Grade: C] or BY 260 [Min Grade: C] or BY 271 [Min Grade: C]

BY 474. Chemical Ecology. 3 Hours.
Study of chemical interactions between organisms or between organisms and their enviroment. Topics include chemical signaling between organisms, sensing of the chemical environment, and chemical defenses against predators, pathogens, biofoulers, or competitors. Students will be introduced to these topics in a wide variety of terrestrial and aquatic habitats.
Prerequisites: BY 124 [Min Grade: C] and CH 235 [Min Grade: C]

BY 475. Comparative Developmental Biology. 3 Hours.
Mechanisms of development with emphasis on comparative biology.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C]
BY 480. Emergency Medicine Internship. 3 Hours.
This semester-long internship is designed to provide undergraduate students with an authentic hands-on medical research experience. The course will allow students the opportunity to assist faculty members and residents of the UAB Department of Emergency Medicine in their clinical research studies. Specifically, students will be involved in patient recruitment for the study, determine patient eligibility, reading information about the studies to patients, and collecting data regarding patient history. Students will also have the methodology associated with clinical research. Junior or senior standing, minimum GPA of 3.5, completed application and acceptance into the internship program required.

BY 484. Bio Capstone: Chemical Ecology. 4 Hours.
Study of chemical interactions between organisms or between organisms and their environment. Topics include chemical signaling between organisms, sensing of the chemical environment, and chemical defenses against predators, pathogens, biofoulers, or competitors. Students will be introduced to these topics in a wide variety of terrestrial and aquatic habitats. Students who enroll in this class as their capstone experience are expected to do writing and ethics assignments to fulfill their capstone requirement.
Prerequisites: BY 124 [Min Grade: C] and CH 235 [Min Grade: C]

BY 485. Special Topics in Biology. 0-4 Hours.
This course will consider topics from the various disciplines in the biological sciences and the topic will differ each term. Course requirements may include lecture, laboratory, readings, discussion, reporting, and internships or fieldwork, which may be conducted on- or off-campus. May be taken more than once for credit.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 487. Biology Senior Experience. 0 Hours.
Graduating Seniors in the Undergraduate Biology Major will submit documents and complete assessments required for graduation.

BY 488. Instructional Teaching Practicum. 1-3 Hour.
This course is specially designed to introduce students to the learning and teaching of biology in the college classroom. We will begin our discussions with exploring current issues in biology education and the need for a reform in the light of different teaching methodologies. It will then be followed upon by easily implementable strategies for your respective weekly group discussions. These sessions will be in the form of a series of four/five workshops followed by monthly check-in dates. Honors section will include semester projects.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 489. Chromatin Biology Research Lab. 0-3 Hours.
This Classroom Undergraduate Research Experience is designed for students transferring to UAB and introduces them to original research in a classroom setting. The students will learn laboratory skills in molecular genetics by producing the reagents such as plasmid constructs or recombinant proteins. The students will be introduced to the scope of the project, read relevant literature, and will conclude their research experience by writing a journal-style report on their results. Thus, this course promotes proficiency in laboratory skills, writing of laboratory reports, and scientific literacy.

BY 490. Bio Capstone: Human Physiology. 4 Hours.
Physiological processes occurring at cell, tissue, organ, and system levels in mammals with emphasis on humans. Students that enroll in this capstone experience will be expected to do additional work to fulfill their biology capstone requirement. Lecture and Laboratory. Foundation in anatomy recommended (Human Anatomy or Vertebrate Zoology).
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C] and CH 237 [Min Grade: C] and (CH 238 [Min Grade: C] or CH 239 [Min Grade: C]))

BY 491. Biology Capstone - Evolution. 4 Hours.
The course introduces the history of evolutionary thought and modern evolutionary theory. Discussions cover (but are not limited to) the history of life, mechanisms of evolutionary change, sexual selection, adaptation, speciation, and molecular evolution. Students will be introduced to historical and contemporaty studies of evolution on a wide variety of topics and organisms. Students that enroll in this class as their capstone experience are expected to do writing and ethics assignments to fulfill their capstone requirement.

BY 492. Biology Capstone - Undergraduate Research. 4 Hours.
Research project under supervision of faculty sponsor. Student must enroll for 4 credit hours and must have senior standing. Students who enroll in this course as their capstone experience will be required to do additional work to fulfill their biology capstone requirement.

BY 493. Biology Capstone - Honors Research. 4 Hours.
Research project under supervision of faculty sponsor. You must enroll in 4 credit hours and you must have senior standing. Students that identify this course as their capstone experience will be required to do additional work to fulfill their biology capstone requirement.

BY 495. Special Topics in Biology. 0-4 Hours.
This course will consider topics from the various disciplines in the biological sciences and the topic will differ each term. Course requirements may include lecture, laboratory, readings, discussion, reporting, and internships or fieldwork, which may be conducted on- or off-campus. May be taken more than once for credit.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 496. Fundamentals of Clinical Research. 3 Hours.
Issues relevant to the conduct of clinical research: ethics, hypothesis testing, study design, and data collection and management. Lecture and clinical interaction with patients. Prerequisites: Junior or Senior level biology majors; 15 hours of biology credit with a 3.5 GPA in biology courses, and permission of instructor.

BY 498. Honors Research. 1-6 Hour.
Research project for students admitted to Honors Research Program. Two or three terms required during which minimum of 6 semester hours must be earned. Grade assigned at completion of program. 18 hours of biology with minimum GPA of 3.5 in biology classes and admission to Honors Research Program required.

BY 499. Biology Seminar. 1 Hour.
Student presentations and discussions. Subject matter varies by term. See current class schedule for topic. Senior standing and permission of instructor required.

MESC-Marine Environmental Sci Courses

MESC 106. Introduction to Oceanography. 4 Hours.
General introduction to the physics, chemistry, geology, and biology of the ocean. Lecture, laboratory, and field trips. Course is taught at Dauphin Island Sea Lab.
MESC 128. Ocean Science. 4 Hours.
Marine environment and relation of ocean to man. Lecture, laboratory, and field work. For non-science majors. Does not count towards the biology major or minor. General elective credit only. Course is taught at Dauphin Island Sea Lab.

MESC 201. Oceanology of the Gulf of Mexico. 2 Hours.
Descriptive study of the oceanology of the Gulf of Mexico and adjacent waters, including coastal zone, continental shelf, and deep ocean. Course is taught at Dauphin Island Sea Lab.

MESC 204. Coastal Geomorphology. 2 Hours.
Shape and land forms along coast; factors determining formation. Lecture and lab. Course is taught at Dauphin Island Sea Lab.

MESC 206. Marine Biology. 4 Hours.
Invertebrates, vertebrates, and marine plants. Lecture, laboratory, and field work. Permission of instructor required. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: D]

MESC 207. Commercial Marine Fisheries of Alabama. 2 Hours.
Biology, harvest techniques, processing, and economic value of local commercial species. Course is taught at Dauphin Island Sea Lab.

MESC 208. Biology and Conservation of Marine Turtles. 2 Hours.
Overview of the biology and conservation of marine turtles. Lecture and laboratory. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: D]

MESC 209. Hurricanes of the Gulf of Mexico. 2 Hours.
Survey of hurricane formation and impacts with emphasis on hurricanes in the Gulf of Mexico. Does not count towards the biology major or minor. General elective credit only. Course is taught at Dauphin Island Sea Lab.

MESC 213. Shark & Ray Biology. 2 Hours.
Introduction to the biology of sharks and rays, with emphasis on regional shark and ray fauna. Lecture and laboratory. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: C]

MESC 216. Shark and Ray Biology. 2 Hours.
Introduction to the biology of sharks and rays, with emphasis on regional shark and ray fauna. Lecture and laboratory. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: C]

MESC 220. Marine Aquaculture. 2 Hours.
This course will introduce students to techniques in marine shellfish aquaculture (both commercial and research production) with an emphasis on production techniques, water quality, nutrition, reproduction, and economics of commercially important species. This course is also designed to assist students with problem solving and communication skills.

MESC 230. The Ecology of Florida Everglades. 2 Hours.
This course will examine the natural history and ecology of one of the world's rarest and most endangered wilderness areas. The Everglades is the only area of our planet to be designated as a National Park, an International Biosphere Reserve, and a World Heritage Park. This two-week course will consist of a week of intensive lectures and discussions, focusing on the natural history, geology, hydrology, and biota of this system, and then a week of intense field time to examine the Everglades and associated systems. The field portion of the course will consist of day-long excursions and hikes, as well as tent camping in several of Florida's state parks. As such, participants should bring appropriate gear and be prepared to actively and cheerfully participate. Special fees apply and will be determined by the number of participants in the course.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] or BY 260 [Min Grade: C] or BY 256 [Min Grade: C] or BY 255 [Min Grade: C]

MESC 302. Coastal Zone Management. 2 Hours.
Ecological features and set of physical management policies for coastal communities, with description of relevant federal and state programs. Course is taught at Dauphin Island Sea Lab.

MESC 303. Coastal Climatology. 2 Hours.
Physical factors resulting in climatic conditions of coastal regions, with emphasis on northern Gulf of Mexico. Does not count towards the biology major or minor. General elective credit only. Course is taught at Dauphin Island Sea Lab.

MESC 304. Marine Geology. 4 Hours.
Geology of ocean basins, with emphasis on continental shelves, sediments, and sedimentary processes. Course is taught at Dauphin Island Sea Lab.
Prerequisites: ES 101 [Min Grade: D] and ES 102 [Min Grade: D]

MESC 305. Dolphins and Whales. 2 Hours.
Classification, anatomy, and ecology of cetaceans. Lecture and laboratory. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: D]

MESC 330. Marine Conservation Biology. 4 Hours.
This course will explore the major threats to marine biodiversity as well as the pros and cons of the potential solutions to these threats. In addition, students will participate in field trips that support topics covered in lecture, and will demonstrate the application of current principles in marine conservation.

MESC 402. Marine Vertebrate Zoology. 4 Hours.
Marine fishes, reptiles, and mammals (systematics, zoogeography, and ecology). Lecture, laboratory, and field work. 12 semester hours in biology required. Course is taught at Dauphin Island Sea Lab.

MESC 407. Marine Botany. 4 Hours.
Marine algae and vascular and non-vascular plants (distribution, identification, structure, ecology, and reproduction). Lecture, laboratory, and field work. 12 semester hours in biology required. Course is taught at Dauphin Island Sea Lab.

MESC 411. Coastal Wetlands Ecology. 4 Hours.
Habitat analysis, natural history studies, and population dynamics of selected organisms. Lecture, laboratory, and field work. Course is taught at Dauphin Island Sea Lab.
Prerequisites: MESC 412 [Min Grade: D] or BY 470 [Min Grade: D]
MESC 412. Marine Ecology. 4 Hours.
Bioenergetics, community structure, population dynamics, predation, competition, and speciation in marine ecosystems. Lecture, laboratory and field work. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 255 [Min Grade: D] or BY 256 [Min Grade: D]

MESC 413. Marine Invertebrate Zoology. 4 Hours.
Natural history, systematics, and morphology of marine invertebrates. Lecture, laboratory and field work. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: D]

MESC 415. Coastal Ornithology. 2 Hours.
Coastal and pelagic birds, with emphasis on ecology, taxonomy, and distribution. Lecture, laboratory, and field work. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 124 [Min Grade: D]

MESC 417. Marine Technical Methods. 2 Hours.
Hardware of marine science, sampling procedures, processing station location, and field equipment maintenance and operation. Prerequisite: 12 semester hours in a science discipline. Course is taught at Dauphin Island Sea Lab.

MESC 428. Oceanography. 4 Hours.
Physics, chemistry, biology, and geology of oceans. Course is taught at Dauphin Island Sea Lab.
Prerequisites: CH 117 [Min Grade: D] and CH 118 [Min Grade: D] and PH 202 [Min Grade: D] and MA 106 [Min Grade: D]

MESC 472. Marine Aquaculture. 2 Hours.
Science, techniques, and economics of marine aquaculture. Lecture and laboratory. BY 255 is a recommended prerequisite. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 256 [Min Grade: D] or BY 435 [Min Grade: D]

MESC 473. Marine Fish Diseases. 4 Hours.
Introduction to aquatic animal diseases, specifically for fish and shellfish. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 271 [Min Grade: D] and (BY 255 [Min Grade: D] or BY 256 [Min Grade: D])

MESC 475. Marine Behavioral Ecology. 4 Hours.
Behavior of marine organisms as it relates to survival in their environment. Lecture, laboratory and field trips. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 255 [Min Grade: D] or BY 256 [Min Grade: D]

MESC 478. Advanced Anatomy and Evolution of Marine Fishes. 3 Hours.
Anatomical studies of marine fishes with emphasis on function and structure; evolutionary and taxonomic relationships. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 256 [Min Grade: D]

MESC 479. Marine Toxicology. 4 Hours.
Selected topics of toxicology as related to the coastal environment and marine organisms. Course is taught at Dauphin Island Sea Lab.
Prerequisites: BY 330 [Min Grade: D] and (CH 235 [Min Grade: D] or CH 237 [Min Grade: D])

MESC 491. Research on Special Topics. 1-6 Hour.
Enrollment by special arrangement in any subject listed. Permission of MESC representative, Department of Biology required. Course is taught at Dauphin Island Sea Lab.

MESC 492. Special Topics: Lecture. 2-4 Hours.
Lectures on selected marine-related topics. Course content varies. Course is taught at Dauphin Island Sea Lab.