

NATURAL SCIENCES

New Student Advising FALL 2023

Welcome to the Rice University Class of 2027!

This booklet is designed to give you an overview of the departments and undergraduate degree programs available in the Wiess School of Natural Sciences. We've included some general information, descriptions of each of our departments and programs, and degree summaries and sample degree plans for each Natural Sciences degree.

This booklet is intended as a supplement to, not a replacement for, other department advising materials. While we have double-checked all of the information in this booklet for accuracy, it is always possible that an error may still be included. **The information in the *General Announcements* is the final authority on degree requirements and academic regulations at Rice.**



RICE UNIVERSITY
Natural Sciences

CONTENTS

GENERAL ADVICE

- 5 Divisional Advisors
- 6 AP Credit
- 6 Choosing a BA or BS Degree
- 7 Pre-Health Professions
- 7 Study Abroad
- 8 Endorsement in Science Engagement
- 9 Undergraduate Research

DEPARTMENTS & PROGRAMS

- 11 Introduction
- 12 Biosciences
- 26 Chemical Physics
- 29 Chemistry
- 36 Earth, Environmental and Planetary Sciences
- 44 Environmental Science
- 51 Kinesiology
- 57 Mathematics
- 64 Neuroscience
- 72 Physics and Astronomy

REFERENCE INFORMATION

- 85 Major Advisors

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AP CREDIT

Many incoming Rice students have AP credit in biology, chemistry, math or physics. Each of these departments has provided information in the Departments and Programs section of this booklet to help students with AP credit select courses for your first semester at Rice. All students are encouraged to talk to their advisors and the course instructors to help with course selection. Pre-health students should also consult with the Office of Academic Advising's pre-health advisors to ensure that your course selection keeps you on track to fulfill medical or other health-professional school admission requirements.

CHOOSING A BA OR BS DEGREE

Most of our departments offer both a Bachelor of Arts (BA) degree and a Bachelor of Science (BS) degree. In general, a BA program contains more free elective hours than its BS counterpart. This makes it easier for you to pursue your other interests, a double major or a minor.

Both BA and BS degrees prepare students for a variety of career paths and for graduate and professional schools. If you are planning to go to graduate school or pursue a career in a scientific discipline, you should consider the BS degree, which provides greater depth of study in your major. If you are preparing for a career that is not primarily in a scientific discipline and want to pursue other areas of interest alongside your Natural Sciences major, the BA degree might be right for you.

The major requirements and a sample degree plan for both the BA and BS degrees are included in this booklet. Look through these to understand the different requirements and how they work with your planned course schedule.

PRE-HEALTH PROFESSIONS

Many incoming Rice students have an interest in medicine, and there are many areas of study at Rice that will help you prepare for a career in the health professions. Not every pre-med student at Rice is the same — your constellation of interests is likely different from other health-interested students, and you should enjoy and share in your diversity. Consult with your advising team to ensure that your degree plan includes all of the necessary courses, but take the time to explore the many departments on campus with tools to address questions relating to human health and wellbeing to find the right major for you.

The Office of Academic Advising offers specialized advising services for pre-med and other pre-health professions students. Join them for their Freshman Health Professions Advising Orientation to start preparing early for potential health profession tracks. Visit oaa.rice.edu for details.

STUDY ABROAD

If you are interested in studying abroad, international experiences are possible for Natural Sciences students in all majors. Early planning and consultation is very helpful for fitting an international experience into your degree plan, so we encourage interested students to reach out to department major advisors early to discuss your options.

There are many options available for interested students during the academic year and the summer, including research experiences that include international travel.

Rice's Study Abroad office (abroad.rice.edu) also provides information and support for students exploring the options for study abroad experiences.

ENDORSEMENT IN SCIENCE ENGAGEMENT

The Pathways to Discovery program in the School of Natural Sciences aims to give all Natural Sciences students the opportunity to develop the skills they need to become the scientific leaders and decision makers of tomorrow. Events and resources are designed to provide students with personalized academic advising, strengthen bonds between Natural Sciences students and faculty, engage undergraduate students in research across all disciplines, expose students to the full range of career opportunities accessible to Natural Sciences graduates, and connect students to the Houston community.

As part of the Pathways program, the School offers an Endorsement in Science Engagement, granted and administered by the Wiess School of Natural Sciences. The Endorsement is ideal for students interested in learning more about public science communication and outreach without a significant time commitment.

The Endorsement is available to students in any discipline and can be completed at any time during a student's education. In order to complete the Endorsement, students must attend a total of six events related to public science communication and/or science outreach and submit a brief analysis of each qualifying event.

Visit naturalsciences.rice.edu/endorsement-science-engagement for more information.

UNDERGRADUATE RESEARCH

Research is required for many of our BS degrees and is encouraged for all Natural Sciences students. There are many opportunities to conduct research with Rice faculty and with our partners in the Houston area, including at the Texas Medical Center. It is possible to find research opportunities early in your time at Rice, but it is typically recommended that first year students take at least one semester to adjust to Rice before joining a research lab. Look through the Departments and Programs section of this booklet to find more advice on undergraduate research in each Natural Sciences discipline.

Natural Sciences Undergraduate Research Fair

Attend the Natural Sciences Undergraduate Research Fair on Friday, October 6, 2023 to learn more about the wide range of mentored undergraduate research experiences available on campus and off campus, including at the Texas Medical Center. This poster session and resource fair features current research opportunities in all Natural Sciences departments and programs.

Office of Undergraduate Research and Inquiry

In addition to our Natural Sciences faculty, Rice's Office of Undergraduate Research and Inquiry, or OURI, is another great resource for students who want to understand what research is before jumping in. Visit ouri.rice.edu/getting-started for useful resources for getting started in your exploration of research opportunities and to connect with their Peer Research Ambassadors, students who have engaged in research during their undergrad careers who want to help other students get involved.

DEPARTMENTS AND PROGRAMS

In this section, you will find information about each of our departments and programs, including advice and tips to help you choose your major and design your degree plan. The School of Natural Sciences offers 19 majors and 7 minors within our departments and interdisciplinary programs. Here, we list the degree requirements for each major and minor.

The provided degree summaries for each of the degrees offered in the School of Natural Sciences are intended to help you compare majors and provide a starting point for designing your own course schedule.

There are many paths you can choose to complete each degree. Consult with your advising team to develop a personalized degree plan that takes into account your background and interests.

Sample Degree Plans

The sample degree plan is only one of many possible schedules.

- The sample degree plans in this booklet assume that you have no AP or transfer credit unless otherwise noted.
- You are assigned a semester in which to take a Freshman Writing Intensive Seminar (FWIS). In all degree plans, the FWIS is shown in the fall semester. If you are assigned to take a FWIS in the spring, swap the Distribution course listed for the spring semester with the FWIS listed for the fall semester.

The information in the *General Announcements* is the final authority on degree requirements and academic regulations at Rice.

BIOSCIENCES

Biosciences hosts a vibrant community engaged in research, teaching and scholarship across a wide range of life-science disciplines. To support the diverse biological interests of our students, the Biosciences major offers four distinct major concentrations: Biochemistry, Cell Biology and Genetics, Ecology and Evolutionary Biology, and Integrative Biology.

While each major concentration has a distinct focus area, all offer both BA and BS options. Both the BA and BS offer the same depth of content, allow for participation in undergraduate research and prepare students for a diversity of career paths. Although encouraged of all Biosciences students, research participation is required for the BS degree making the BS particularly well suited for students seeking entry into graduate school and careers in research. Biosciences undergraduates are enthusiastic about pursuing original research and avail themselves of the numerous research opportunities at Rice and in the Houston community.

Throughout their time at Rice, all Biosciences majors will gain the skills needed to evaluate the scientific literature; design experiments; and collect, analyze and communicate data. These transferrable skills will equip them for graduate, medical or other professional schools and a wide range of careers in the life sciences and beyond. Qualified students, interested in graduate school, have the option to apply to a specialized BA-MS-PhD program track at the end of their sophomore year.

For those in other majors and with a deep interest in the life sciences, Biosciences also offers two minors: Biochemistry and Cell Biology and Ecology and Evolutionary Biology. For example, students interested in computational biology may wish to pair one of these minors with a major in Computer Science or Computational and Applied Math. Students interested in medicine but majoring in the Humanities or Social Sciences may be interested in the Biochemistry and Cell Biology minor as it includes many of the life science core courses required for the health professions.

BIOSCIENCES

Degrees Offered

Biosciences	BA, BS
Biochemistry and Cell Biology	Minor
Ecology and Evolutionary Biology	Minor

Frank Advice

- Join the Biosciences Opportunities Canvas site and mailing list; go to catalog.rice.edu to enroll. This is our main venue for up-to-date information about Biosciences advising and research opportunities.
- Those without AP biology credit should enroll in BIOS 201 and BIOS 202 in their first year as these courses are required for all Biosciences major concentrations and are prerequisites for virtually all other courses in the major.
- If you have AP credit and feel confident in your biology background, you can consider BIOS 300 (Paradigms in Biochemistry and Cell Biology), a 3-credit course designed for first year students with AP biology credit; BIOS 332 (Ecology); BIOS 334 (Evolution) or BIOS 340 (Integrative Animal Physiology) depending on your interests.
- First-year students wishing to take a lab course can enroll in the optional courses FWIS 115 (Exploring Biological Research) or NSCI 120 (Introduction to Scientific Research Challenges). These courses can satisfy the prerequisite for the independent research course BIOS 310.
- Research participation is encouraged for all students and required for the BS degrees. Visit biosugresearch.rice.edu and join the Biosciences Opportunities Canvas site for more information and postings to help you find and succeed in a lab at Rice, the Texas Medical Center and beyond.
- Not required but highly-recommended courses:
 - BIOS 118/BIOS 119—First-Year Seminar in Local Biology Research
 - FWIS 115 or NSCI 120—lab courses for first year students

Biosciences BA - Requirements

CHEM 121 or CHEM 111	General Chemistry I or AP/OTH credit in General Chemistry I
CHEM 123 or CHEM 113	General Chemistry Laboratory I or AP/OTH credit in General Chemistry Lab I
MATH 101 or MATH 105	Single Variable Calculus I or AP/OTH credit in Calculus I
MATH 102 or MATH 106	Single Variable Calculus II or AP/OTH credit in Calculus II
PHYS 125*	General Physics (with lab)
STAT 305* or STAT 315/DSCI 301	Introduction to Statistics for Biosciences or Probability and Statistics for Data Science
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

Select 1 lecture course offered by the School of Natural Sciences or the School of Engineering at the 200-level or above

Students must complete coursework that satisfies the requirements of one major concentration.

Major Concentration in Biochemistry

CHEM 122 or CHEM 112	General Chemistry II or AP/OTH credit in General Chemistry II
CHEM 124 or CHEM 114	General Chemistry Laboratory II or AP/OTH credit in General Chemistry Lab II
CHEM 211 and CHEM 213	Organic Chemistry I and Organic Chemistry Discussion I
PHYS 126*	General Physics II (with Lab)
BIOS 301	Biochemistry I
BIOS 302	Biochemistry II
BIOS 352	Physical Chemistry for the Biosciences

Select 2 courses from the Elective Lecture Courses list for the Major Concentration in Biochemistry in the 2023 GA

BIOS 211	Intermediate Experimental Cellular and Molecular Biosciences
BIOS 311	Experimental Biochemistry

Select 2 courses from the Elective Laboratory Courses list for the Major Concentration in Biochemistry in the 2023 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Biochemistry in the 2023 GA

Biosciences BA

Major Concentration in Cell Biology and Genetics

CHEM 122 *or* CHEM 112 General Chemistry II *or* AP/OTH credit in General Chemistry II
CHEM 124 *or* CHEM 114 General Chemistry Laboratory II *or* AP/OTH credit in General Chemistry Lab II
CHEM 211 *and* CHEM 213 Organic Chemistry I *and* Organic Chemistry Discussion I

BIOS 301 Biochemistry I
BIOS 341 Cell Biology
BIOS 344 Molecular Biology and Genetics

Select 3 courses from the Elective Lecture Courses list for the Major Concentration in Cell Biology and Genetics in the 2023 GA

BIOS 211 Intermediate Experimental Cellular and Molecular Biosciences

Select 3 courses from the Elective Laboratory Courses list for the Major Concentration in Cell Biology and Genetics in the 2023 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Cell Biology and Genetics in the 2023 GA

Major Concentration in Ecology and Evolutionary Biology

BIOS 312 Advanced Communication in the Biological Sciences
BIOS 332 Ecology
BIOS 334 Evolution
BIOS 338 Analysis and Visualization of Biological Data

Select 3 courses from the Elective Lecture Courses in Ecology and Evolutionary Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

Select 2 courses from the Elective Lecture Courses list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

BIOS 213 Introductory Lab in Ecology and Evolution

Select 3 courses from the Elective Laboratory Courses list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

Biosciences BA

Major Concentration in Integrative Biology

CHEM 122 *or* CHEM 112 General Chemistry II *or* AP/OTH credit in General Chemistry II

CHEM 124 *or* CHEM 114 General Chemistry Laboratory II *or* AP/OTH credit in General Chemistry Lab II

CHEM 211 *and* CHEM 213 Organic Chemistry I *and* Organic Chemistry Discussion I

BIOS 301 Biochemistry I

BIOS 332 Ecology

BIOS 334 Evolution

BIOS 341 Cell Biology

Select 1 course from the Elective Lecture Course in Ecology and Evolutionary Biology list for the Major Concentration in Integrative Biology in the 2023 GA

Select 1 course from the Elective Lecture Course in Biochemistry and Cell Biology list for the Major Concentration in Integrative Biology in the 2023 GA

BIOS 211 Intermediate Experimental Cellular and Molecular Biosciences

BIOS 213 Introductory Lab in Ecology and Evolution

Select 2 courses from the Elective Laboratory Courses list for the Major Concentration in Integrative Biology in the 2023 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Integrative Biology in the 2023 GA

* PHYS 101 *and* PHYS 103 *or* PHYS 111 may be substituted for PHYS 125

PHYS 102 *and* PHYS 104 *or* PHYS 112 may be substituted for PHYS 126

STAT 280 *or* STAT 180 may be substituted for STAT 305 (or STAT 315/DSCI 301)

Biosciences BS - Requirements

CHEM 121 <i>or</i> CHEM 111	General Chemistry I <i>or</i> AP/OTH credit in General Chemistry
CHEM 123 <i>or</i> CHEM 113	General Chemistry Laboratory I <i>or</i> AP/OTH credit in General Chemistry Lab I
MATH 101 <i>or</i> MATH 105	Single Variable Calculus I <i>or</i> AP/OTH credit in Calculus I
MATH 102 <i>or</i> MATH 106	Single Variable Calculus II <i>or</i> AP/OTH credit in Calculus II
PHYS 125*	General Physics (with lab)
STAT 305*	Introduction to Statistics for Biosciences
<i>or</i> STAT 315/DSCI 301	<i>or</i> Probability and Statistics for Data Science
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

Select 1 lecture course offered by the School of Natural Sciences or the School of Engineering at the 200-level or above

Students must complete coursework that satisfies the requirements of one major concentration.

Major Concentration in Biochemistry

CHEM 122 <i>or</i> CHEM 112	General Chemistry II <i>or</i> AP/OTH credit in General Chemistry II
CHEM 124 <i>or</i> CHEM 114	General Chemistry Laboratory II <i>or</i> AP/OTH credit in General Chemistry Lab II
CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Organic Chemistry Discussion I
PHYS 126*	General Physics II (with lab)
BIOS 301	Biochemistry I
BIOS 302	Biochemistry II
BIOS 352	Physical Chemistry for the Biosciences

Select 2 courses from the Elective Lecture Courses list for the Major Concentration in Biochemistry in the 2023 GA

BIOS 211	Intermediate Experimental Cellular and Molecular Biosciences
BIOS 311	Experimental Biochemistry

Select 1 course from the Elective Laboratory Course list for the Major Concentration in Biochemistry in the 2023 GA

Select 1 from:

BIOS 310	Independent Research for Biosciences Undergraduates (at least 3 credit hours/semester for a min. of 3 semesters)
BIOS 310 <i>and</i> BIOS 401 <i>and</i> BIOS 411 <i>and</i> BIOS 402 <i>and</i> BIOS 412	Independent Research for Biosciences Undergraduates <i>and</i> UG Honors Research <i>and</i> UG Research Seminar <i>and</i> UG Honors Research <i>and</i> UG Research Seminar

Select 1 course from the Capstone Requirement list for the Major Concentration in Biochemistry in the 2023 GA

Biosciences BS

Major Concentration in Cell Biology and Genetics

CHEM 122 or CHEM 112	General Chemistry II or AP/OTH credit in General Chemistry II
CHEM 124 or CHEM 114	General Chemistry Laboratory II or AP/OTH credit in General Chemistry Lab II
CHEM 211 and CHEM 213	Organic Chemistry I and Organic Chemistry Discussion I
BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 344	Molecular Biology and Genetics

Select 3 courses from the Elective Lecture Courses list for the Major Concentration in Cell Biology and Genetics in the 2023 GA

BIOS 211	Intermediate Experimental Cellular and Molecular Biosciences
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Select 2 courses from the Elective Laboratory Courses list for the Major Concentration in Cell Biology and Genetics in the 2023 GA

Select 1 from:

BIOS 310	Independent Research for Biosciences Undergraduates (at least 3 credit hours/semester for a min. of 3 semesters)
BIOS 310 and BIOS 401 and BIOS 411 and BIOS 402 and BIOS 412	Independent Research for Biosciences Undergraduates and UG Honors Research and UG Research Seminar and UG Honors Research and UG Research Seminar

Select 1 course from the Capstone Requirement list for the Major Concentration in Biochemistry in the 2023 GA

Major Concentration in Ecology and Evolutionary Biology

BIOS 312	Advanced Communication in the Biological Sciences
BIOS 332	Ecology
BIOS 334	Evolution
BIOS 338	Analysis and Visualization of Biological Data

Select 3 courses from the Elective Lecture Courses in Ecology and Evolutionary Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

Select 2 courses from the Elective Lecture Courses list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

BIOS 213	Introductory Lab in Ecology and Evolution
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Select 2 courses from the Elective Laboratory Courses list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

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Biosciences BS

Major Concentration in Ecology and Evolutionary Biology *continued*

Select a minimum of 9 credit hours from:

BIOS 310	Independent Research for Biosciences Undergraduates
BIOS 401 <i>and</i> BIOS 402	Undergraduate Honors Research
BIOS 402 <i>and</i> BIOS 412	Undergraduate Honors Research and UG Research Seminar

Select 1 course from the Capstone Requirement list for the Major Concentration in Ecology and Evolutionary Biology in the 2023 GA

Major Concentration in Integrative Biology

CHEM 122 <i>or</i> CHEM 112	General Chemistry II <i>or</i> AP/OTH credit in General Chemistry II
CHEM 124 <i>or</i> CHEM 114	General Chemistry Laboratory II <i>or</i> AP/OTH credit in General Chemistry Lab II
CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Organic Chemistry Discussion I

BIOS 301	Biochemistry I
BIOS 332	Ecology
BIOS 334	Evolution
BIOS 341	Cell Biology

Select 1 course from the Elective Lecture Course in Ecology and Evolutionary Biology list for the Major Concentration in Integrative Biology in the 2023 GA

Select 1 course from the Elective Lecture Course in Biochemistry and Cell Biology list for the Major Concentration in Integrative Biology in the 2023 GA

BIOS 211	Intermediate Experimental Cellular and Molecular Biosciences
BIOS 213	Introductory Lab in Ecology and Evolution

Select 1 course from the Elective Laboratory Course list for the Major Concentration in Integrative Biology in the 2023 GA

Select 1 from:

BIOS 310	Independent Research for Biosciences Undergraduates (at least 3 credit hours/semester for a min. of 3 semesters)
BIOS 310 <i>and</i> BIOS 401 <i>and</i> BIOS 411 <i>and</i> BIOS 402 <i>and</i> BIOS 412	Independent Research for Biosciences Undergraduates <i>and</i> UG Honors Research <i>and</i> UG Research Seminar <i>and</i> UG Honors Research <i>and</i> UG Research Seminar

Select 1 course from the Capstone Requirement list for the Major Concentration in Integrative Biology in the 2023 GA

* PHYS 101 *and* PHYS 103 *or* PHYS 111 may be substituted for PHYS 125
 PHYS 102 *and* PHYS 104 *or* PHYS 112 may be substituted for PHYS 126
 STAT 280 *or* STAT 180 may be substituted for STAT 305 (or STAT 315/DSCI 301)

SAMPLE DEGREE PLAN

Biosciences BA and BS* - Major Concentration in Biochemistry

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN			FRESHMAN		
		16 credits			14 credits
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective (suggested: NSCI 120, BIOS 118)	3	DIST	Distribution Course	3
SOPHOMORE			SOPHOMORE		
		15 credits			16 credits
BIOS 211	Intermediate Experimental Cellular & Molecular Biosciences	2	BIOS 301	Biochemistry I	3
CHEM 211	Organic Chemistry I	3	BIOS Lab 300+	Elective Lab	2
CHEM 213	Organic Chemistry Discussion I	0	PHYS 126	General Physics II (with lab)	4
PHYS 125	General Physics (with lab)	4	STAT 305	Intro to Statistics for Biosciences	4
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3			
JUNIOR			JUNIOR		
		15 credits			14 credits
BIOS 300+	Elective Lecture	3	BIOS 302	Biochemistry II	3
NSCI/ENG 200+	Level Elective	3	BIOS 311	Experimental Biochemistry	2
BIOS Lab 300+/310*	Elective Lab/Research*	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN/BIOS 310*	Open Elective/Research*	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR			SENIOR		
		15 credits			15 credits
BIOS 352	Physical Chemistry	3	BIOS 300+	Elective Lecture	3
OPEN/BIOS 310*	Open Elective/Research*	3	BIOS 400+	Capstone Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

*BS is the same as BA but will have one fewer lab elective and at least 9 credit hours of research

SAMPLE DEGREE PLAN

Biosciences BA and BS - Major Concentration in Cell Biology and Genetics

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		16 credits	FRESHMAN		14 credits
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective (suggested: NSCI 120, BIOS 118)	3	DIST	Distribution Course	3
SOPHOMORE		15 credits	SOPHOMORE		16 credits
BIOS 211	Experimental Cellular & Molecular Biosciences	2	BIOS 341	Cell Biology	3
CHEM 211	Organic Chemistry I	3	NSCI/ENG	200+ level Elective	3
CHEM 213	Organic Chemistry Discussion I	0	STAT 305	Intro to Statistics for Biosciences	4
PHYS 125	General Physics (with lab)	4	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		15 credits	JUNIOR		14 credits
BIOS 301	Biochemistry I	3	BIOS 344	Molecular Biology and Genetics	3
BIOS 300+	Elective Lecture	3	BIOS Lab 300+	Elective Lab	2
BIOS Lab 300+/310*	Elective Lab/Research*	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN/BIOS 310*	Open Elective/Research*	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
BIOS Lab 300+	Elective Lab	2	BIOS 400+	Capstone Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN/BIOS 310*	Open Elective/Research*	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
COLL	College Course	1			

*BS is the same as BA but will have one fewer lab elective and at least 9 credit hours of research

SAMPLE DEGREE PLAN

Biosciences BA and BS - Major Concentration in Ecology and Evolutionary Biology

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		16 credits	FRESHMAN		13 credits
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	MATH 102	Single Variable Calculus II	3
CHEM 123	General Chemistry Lab I	1	LPAP	Lifetime Physical Activity Elective	1
MATH 101	Single Variable Calculus I	3	DIST	Distribution Course	3
FWIS	First Year Writing-Intensive Seminar	3	OPEN	Open Elective	3
OPEN	Open Elective (suggested: NSCI 120, BIOS 119)	3			
SOPHOMORE		15 credits	SOPHOMORE		15 credits
BIOS 332	Ecology	3	BIOS 334	Evolution	3
BIOS 213	Intro Lab in EEB	2	BIOS 300+	Elective Lecture	3
STAT 305	Intro to Statistics for Biosciences	4	BIOS Lab 300+/310*	Elective Lab/Research*	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		15 credits	JUNIOR		16 credits
BIOS 312	Adv. Communication in the Biological Sciences	2	BIOS 338	Bio Data Analysis	3
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
PHYS 125	General Physics (with lab)	4	BIOS Lab 300+	Elective Lab	1
DIST	Distribution Course	3	NSCI/ENG	200+ level Elective	3
OPEN/BIOS 310*	Open Elective/Research*	3	DIST	Distribution Course	3
			OPEN/BIOS 310*	Open Elective/Research*	3
SENIOR		16 credits	SENIOR		15 credits
BIOS 400+	Capstone Course	3	BIOS 300+	Elective Lecture	3
BIOS 300+	Elective Lecture	3	OPEN	Open Elective	3
BIOS Lab 300+	Elective Lab	1	OPEN	Open Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

*BS is the same as BA but will have one fewer lab elective and at least 9 credit hours of research

SAMPLE DEGREE PLAN

Biosciences BA and BS - Major Concentration in Integrative Biology

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		16 credits	FRESHMAN		14 credits
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective (suggested: NSCI 120, BIOS 118/119)	3	DIST	Distribution Course	3
SOPHOMORE		15 credits	SOPHOMORE		15 credits
BIOS 211	Experimental Cellular and Molecular Biosciences	2	BIOS 213	Intro Lab in EEB	2
BIOS 332	Ecology	3	BIOS 341	Cell Biology	3
CHEM 211	Organic Chemistry I	3	STAT 305	Intro to Statistics for Biosciences	4
CHEM 213	Organic Chemistry I Discussion	0	NSCI/ENG	200+ level Elective	3
PHYS 125	General Physics (with lab)	4	DIST	Distribution Course	3
DIST	Distribution Course	3			
JUNIOR		15 credits	JUNIOR		16 credits
BIOS 301	Biochemistry I	3	BIOS 334	Evolution	3
BIOS Lab 300+/310*	Elective Lab/Research*	3	BIOS Lab 300+	Elective Lab	1
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN/BIOS 310*	Open Elective/Research*	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
DIST	Distribution Course	3	BIOS 400+	Capstone Course	3
OPEN/BIOS 310*	Open Elective/Research*	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

*BS is the same as BA but will have one fewer lab elective and at least 9 credit hours of research

Biochemistry and Cell Biology Minor - Requirements

MATH 101* <i>or</i> MATH 105	Single Variable Calculus I <i>or</i> AP/OTH credit in Calculus I
MATH 102 <i>or</i> MATH 106	Single Variable Calculus II <i>or</i> AP/OTH credit in Calculus II
PHYS 125*	General Physics I (with lab)
PHYS 126*	General Physics II (with lab)
CHEM 121 <i>or</i> CHEM 111	General Chemistry I <i>or</i> AP/OTH credit in General Chemistry I
CHEM 123 <i>or</i> CHEM 113	General Chemistry Laboratory I <i>or</i> AP/OTH credit in General Chemistry Lab I
CHEM 122 <i>or</i> CHEM 112	General Chemistry II <i>or</i> AP/OTH credit in General Chemistry II
CHEM 124 <i>or</i> CHEM 114	General Chemistry Laboratory II <i>or</i> AP/OTH credit in General Chemistry Lab II
CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Organic Chemistry Discussion I
CHEM 215 <i>or</i> CHEM 365	Organic Chemistry Lab
CHEM 320	Organic Chemistry II Honors
BIOS 201	Introductory Biology I
BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 211*	Intermediate Experimental Cellular and Molecular Biosciences

Select 1 course from the Lecture Course Requirement list in the 2023 GA

- * MATH 111 *and* 112 may substitute for MATH 101
- PHYS 101 *and* 103 *or* PHYS 111 may substitute for PHYS 125
- PHYS 102 *and* 104 *or* PHYS 112 may substitute for PHYS 126
- BIOS 212 may *not* be substituted for BIOS 211
- BIOS 310 may *not* be substituted for BIOS 211

Ecology and Evolutionary Biology Minor - Requirements

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
BIOS 213	Introductory Lab in Ecology and Evolution

Select 4 courses from:

BIOS 321	Animal Behavior
BIOS 326	Insect Biology
BIOS 329	Animal Diversity
BIOS 332	Ecology
BIOS 334	Evolution
BIOS 336	Plant Diversity
BIOS 340	Integrative Animal Physiology
BIOS 373	Coral Reef Ecosystems
BIOS 374	Global Change Biology
BIOS 391	Transfer Credit in Ecology and Evolutionary Biology
BIOS 423	Conservation Biology
BIOS 431	Biology of Infectious Diseases

CHEMICAL PHYSICS

The Chemical Physics degree is jointly offered by the Department of Chemistry and the Department of Physics and Astronomy. It is designed for students with strong interests in both chemistry and physics. Students take upper-level courses in both chemistry and physics, focusing on the applications of physics to chemical systems. Schedule a meeting with the Major Advisors listed in this booklet if you are interested in learning more about this interdisciplinary major.

Degrees Offered

Chemical Physics BS

Frank Advice

- Chemical Physics is an interdisciplinary field with upper-level course requirements in both Chemistry and Physics. To stay on-track to graduate in any of the three you need to complete the required introductory courses in chemistry, physics and mathematics during your first year.
- Talk to the PHYS 111 instructor about AP physics. It is usually better to take PHYS 111/112 rather than jumping straight into PHYS 201. If you are unsure what to do, consult the PHYS 111 instructor.
- Most freshmen will take a full-year course in general chemistry (CHEM 121/122/123/124). However, there are three options depending on your background. Students with AP/IB Chemistry or similar credit can choose to take CHEM 201/205 or can go directly to organic chemistry (CHEM 211 or 319) during their freshman year. If you are unsure what to do, talk to a Chemistry advisor.
- Research is not required for the degree, but strongly recommended (and fun!) Opportunities are available in summer and during the school year, but it's not common to start during your first year at Rice.

Chemical Physics BS

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL

SPRING

FRESHMAN			FRESHMAN		
14 credits			15 credits		
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
			DIST	Distribution Course	3
SOPHOMORE			SOPHOMORE		
15 credits			15 credits		
CHEM 211	Organic Chemistry I	3	CHEM 215	Organic Chemistry Lab	2
CHEM 213	Organic Chemistry Discussion	0	CHEM 360	Inorganic Chemistry	3
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
DIST	Distribution Course	3	MATH 211	Differential Equations	3
OPEN	Open Elective	3	DIST	Distribution Course	3
JUNIOR			JUNIOR		
16 credits			15 credits		
CHEM 301	Physical Chemistry I	3	CHEM 302	Physical Chemistry II	3
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
DIST	Distribution Course	3	PHYS 332	Junior Physics Lab II	2
OPEN	Open Elective	3	MATH/ CMOR	300+ level Elective	3
OPEN	Open Elective	3	DIST	Distribution Course	3
SENIOR			SENIOR		
15 credits			15 credits		
CHEM 430	Quantum Chemistry	3	CHEM 420	Classical & Statistical Thermodynamics	3
CHEM 491	Research for Undergraduates	2	DIST	Distribution Course	3
MATH/ CMOR	300+ level Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
COLL	College Course	1			

CHEMISTRY

Chemistry at Rice is where innovation meets collaboration. Two Nobel laureates, dominance in the field of nanoscale science and technology, and significant contributions to both bioscience and materials science have propelled the Department of Chemistry to unparalleled status over the past two decades. Since Chemistry holds a unique position in science and technology, it has been the nucleus of collaboration across departments and schools.

The BS program rigorously prepares students for PhD programs in chemistry and related disciplines. The degree requirements are consistent with the guidelines for certification by the American Chemical Society. BS students complete a series of foundation courses in general chemistry and each of the core areas of chemistry: analytical, biological, inorganic, organic and physical. Students then complete a specialization in one or more of these areas. This curriculum provides a broad and comprehensive introduction to core areas of chemistry while establishing deep understanding in one or more specific fields.

The BA degree is a more flexible program that provides a broad overview of chemistry, but includes less focused study in any single area. The chemistry BA is an ideal background for premedical students, as it requires only 10 credit hours over the standard premedical requirements. It also couples well with a second major for students who want to pair a science and non-science major for breadth of knowledge.

Degrees Offered

Chemistry BA, BS

CHEMISTRY

Frank Advice

- Most freshmen will take a full-year course in general chemistry (CHEM 121/122/123/124). However, there are three options depending on your background. Students with AP/IB Chemistry or similar credit can choose to take CHEM 201/205 or can go directly to organic chemistry (CHEM 211 or CHEM 319) during their freshman year. If you are unsure what to do, talk to a Chemistry advisor.
- Each student working towards a BS degree must complete advanced work in one specialization: Biological and Medicinal Chemistry, Inorganic Chemistry and Inorganic Materials, Organic Chemistry, or Physical and Theoretical Chemistry.
- BS students need at least eight credit hours of research, typically taken over two or three semesters. Seniors planning to pursue a PhD should take Undergraduate Honors Research (CHEM 492 and 493), which includes independent research, a public presentation of findings and a formal thesis.
- One of the best ways to connect with a research advisor is to take the Freshman Chemistry Seminar, CHEM 110, which will introduce you to chemistry research labs at Rice and the Texas Medical Center.

Chemistry BA - Requirements

CHEM 121 *and* CHEM 123* General Chemistry I *and* General Chemistry Laboratory I

Select 1 from:

CHEM 122 *and* CHEM 124* General Chemistry II *and* Laboratory
 CHEM 201 *and* CHEM 205 Advanced Topics in General Chemistry *and* Lab

BIOS 301 Biochemistry I

Select 1 from:

CHEM 211 *and* CHEM 213 Organic Chemistry I *and* Organic Chemistry Discussion I
 CHEM 219 Organic Chemistry I Honors

CHEM 330 Analytical Chemistry

CHEM 360 Inorganic Chemistry

Select 2 from:

BIOS 352 Physical Chemistry for the Biosciences
 CHEM 301 Physical Chemistry I
 CHEM 302 Physical Chemistry II

MATH 101 *or* MATH 105 Single Variable Calculus I *or* AP/OTH credit in Calculus I

MATH 102 *or* MATH 106 Single Variable Calculus II *or* AP/OTH credit in Calculus II

MATH 212* Multivariable Calculus

Select 1 from:

PHYS 101 *and* PHYS 103 Mechanics (with lab) *and* Mechanics Discussion
 PHYS 111 Honors Mechanics (with Lab)
 PHYS 125 General Physics (with Lab)

Select 1 from:

PHYS 102 *and* PHYS 104 Electricity and Magnetism (with Lab) *and* Electricity and Magnetism Discussion
 PHYS 112 Honors Electricity and Magnetism (with Lab)
 PHYS 126 General Physics II (with Lab)

Select 3 from:

BIOS 311 Experimental Biochemistry
 CHEM 365 Organic Chemistry Lab
 CHEM 366 Inorganic Chemistry Lab
 CHEM 367 Materials Chemistry Lab
 CHEM 368 Chemical Measurement Lab

Select 2 from:

BIOS 302 Biochemistry II
 CHEM 320 Organic Chemistry II Honors
 Any lecture course between CHEM 400 and CHEM 489
 Any lecture course between CHEM 495 and CHEM 699

* CHEM 111 *and* 113, 112 *and* 114 may substitute for CHEM 121 *and* 123, 122 *and* 124
 MATH 221 *and* MATH 222 may substitute for MATH 212

Chemistry BA

SAMPLE DEGREE PLAN

This is only one of many possible ways to fulfill your degree requirements.

FALL			SPRING		
FRESHMAN			FRESHMAN		
		14 credits			15 credits
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics (with Lab)	4	PHYS 102	Electricity & Magnetism (with Lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	Electricity & Magnetism Discussion	
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
			DIST	Distribution Course	3
SOPHOMORE			SOPHOMORE		
		15 credits			14 credits
CHEM 319	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
MATH 212	Multivariable Calculus	3	CHEM 365	Organic Chemistry Lab	2
DIST	Distribution Course	3	CHEM 360	Inorganic Chemistry	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR			JUNIOR		
		15 credits			17 credits
BIOS 301	Biochemistry I	3	CHEM 302	Physical Chemistry II	3
CHEM 301	Physical Chemistry I	3	CHEM 368	Chemical Measurement Lab	2
CHEM 366	Inorganic Chemistry Lab	2	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
COLL	College Course	1	OPEN	Open Elective	3
SENIOR			SENIOR		
		15 credits			15 credits
CHEM 4XX	Adv. Chemistry Lecture	3	CHEM 4XX	Advanced Chemistry Lecture	3
CHEM 330	Analytical Chemistry	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

NOTE: There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year — consult your major advisor about your course plan.

Chemistry BS - Requirements

CHEM 121 *and* CHEM 123* General Chemistry I *and* General Chemistry Laboratory I

Select 1 from:

CHEM 122 & CHEM 124*	General Chemistry II and Laboratory
CHEM 201 & CHEM 205	Advanced Topics in General Chemistry and Lab

BIOS 301 Biochemistry I

Select 1 from:

CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Discussion
CHEM 219	Organic Chemistry I Honors

CHEM 301 Physical Chemistry I

CHEM 302 Physical Chemistry II

CHEM 330 Analytical Chemistry

CHEM 360 Inorganic Chemistry

MATH 101 *or* MATH 105 Single Variable Calculus I *or* AP/OTH credit in Calculus I

MATH 102 *or* MATH 106 Single Variable Calculus II *or* AP/OTH credit in Calculus II

MATH 212* Multivariable Calculus

Select 1 from:

PHYS 101 <i>and</i> PHYS 103	Mechanics (with lab) <i>and</i> Mechanics Discussion
PHYS 111	Honors Mechanics (with Lab)
PHYS 125	General Physics (with Lab)

Select 1 from:

PHYS 102 <i>and</i> PHYS 104	Electricity and Magnetism (with Lab) <i>and</i> Electricity and Magnetism Discussion
PHYS 112	Honors Electricity and Magnetism (with Lab)
PHYS 126	General Physics II (with Lab)

Select 3 courses from:

BIOS 311	Experimental Biochemistry
CHEM 365	Organic Chemistry Lab
CHEM 366	Inorganic Chemistry Lab
CHEM 367	Materials Chemistry Lab
CHEM 368	Chemical Measurement Lab

Select 8 credit hours from:

CHEM 391	Research for Undergraduates (at least 3 credit hours)
CHEM 491	Research for Undergraduates
CHEM 492	Undergraduate Honors Research
CHEM 493	Undergraduate Honors Research
CHEM 700	Teaching Practicum (up to 2 credit hours)

* CHEM 111 *and* 113, 112 *and* 114 may substitute for CHEM 121 *and* 123, 122 *and* 124
MATH 221 *and* 222 may substitute for MATH 212

Chemistry BS - Requirements

Students must complete advanced work that satisfies the requirements of one area of specialization.

A NanoChemistry specialization can be added to any of the standard areas of specialization by adding two nanoscience courses

Area of Specialization: Biological and Medicinal Chemistry

CHEM 320	Organic Chemistry II Honors
BIOS 302	Biochemistry II

Select 2 courses from:

Any lecture course between CHEM 400 and CHEM 489
Any lecture course between CHEM 495 and CHEM 699

Area of Specialization: Inorganic Chemistry and Inorganic Materials

CHEM 475	Physical Methods in Inorganic Chemistry
CHEM 495	Transition Metal Chemistry
or CHEM 496	or Advanced Inorganic Chemistry

Select 2 courses from:

Any lecture course between CHEM 400 and CHEM 489
Any lecture course between CHEM 495 and CHEM 699

Area of Specialization: Organic Chemistry

CHEM 320	Organic Chemistry II Honors
CHEM 401	Advanced Organic Chemistry

Select 2 courses from:

BIOS 302	Biochemistry II
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Any lecture course between CHEM 400 and CHEM 489
Any lecture course between CHEM 495 and CHEM 699

Area of Specialization: Physical and Theoretical Chemistry

CHEM 420	Classical and Statistical Thermodynamics
CHEM 430	Quantum Chemistry

Select 1 course from:

CHEM 415	Chemical Kinetics and Dynamics
CHEM 531	Advanced Quantum Chemistry
CHEM 559	Spectroscopy at the Single Molecule/Particle Limit

Select 1 course (for at least 3 credit hours) from MATH or PHYS course offerings at the 400-level or above

Though not required, *MATH 211 is strongly recommended* for students planning to specialize in Physical and Theoretical Chemistry or planning to pursue graduate studies.

Chemistry BS

SAMPLE DEGREE PLAN

This is only one of many possible ways to fulfill your degree requirements.

FALL			SPRING		
FRESHMAN		15 credits	FRESHMAN		15 credits
CHEM 110	Freshman Seminar in Chemistry	1	CHEM 122	General Chemistry II	3
CHEM 121	General Chemistry I	3	CHEM 124	General Chemistry Lab II	1
CHEM 123	General Chemistry Lab I	1	MATH 102	Single Variable Calculus II	3
MATH 101	Single Variable Calculus I	3	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 101	Mechanics (with lab)	4	PHYS 104	Electricity & Magnetism Discussion	0
PHYS 103	Mechanics Discussion	0	LPAP	Lifetime Physical Activity Elective	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
SOPHOMORE		14 credits	SOPHOMORE		17 credits
CHEM 319	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 360	Inorganic Chemistry	3
MATH 212	Multivariable Calculus	3	CHEM 365	Organic Chemistry Lab	2
DIST	Distribution Course	3	CHEM 391	Research for Undergraduates	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
JUNIOR		15 credits	JUNIOR		14 credits
BIOS 301	Biochemistry I	3	CHEM 302	Physical Chemistry II	3
CHEM 301	Physical Chemistry I	3	CHEM 368	Chemical Measurement Lab	2
CHEM 491	Research for Undergraduates	3	CHEM 491	Research for Undergraduates	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		17 credits	SENIOR		14 credits
CHEM 492	Undergraduate Honors Research	5	CHEM 493	Undergraduate Honors Research	5
CHEM 330	Analytical Chemistry	3	CHEM 4XX	Advanced Chemistry Lecture	3
CHEM 4XX	Advanced Chemistry Lecture	3	OPEN	Open Elective	3
CHEM 4XX	Advanced Chemistry Lecture	3	OPEN	Open Elective	3
DIST	Distribution Course	3			

NOTE: While the above sample degree plan suggests 19 credit hours of independent research, the BS degree requires at least eight credit hours.

There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year — consult with your major advisor about your course plan.

EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES

Earth, Environmental and Planetary Sciences majors bring together the fields of data science, mathematics, physics, chemistry and biology to learn how every part of the Earth — from the core to the crust, atmosphere, oceans and life — interacts in time and space to build the habitable planet on which we live. We use our understanding of complex natural systems to investigate how mountains form, how volcanoes and earthquakes develop, how our natural resources form (energy, water, soils and minerals), and how climate and the environment evolve through time.

Using methodologies that range from laboratory, theory, data science and computer modeling to field work, the skills Earth scientists gain make them uniquely poised to advise on some of the most pressing problems of environment and energy facing society today.

The BS major offers three areas of specialization: Geoscience, Environmental Earth Science and Planetary Science. Compared to the BS degree, the BA degree provides greater flexibility of course choices.

Degrees Offered

Earth, Environmental and Planetary Sciences	BA, BS, Minor
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Frank Advice

- If you have AP math credit, consider taking more advanced MATH classes during your first year.
- Most Earth, Environmental and Planetary Sciences majors participate in undergraduate research, either through the course EEPS 481 (Undergraduate Research) or through summer research internships. Many undergraduates also present their own research projects at national and international professional conferences.
- EEPS 114 (Discoveries in EEPS Seminar) is a great introduction to the different areas of Earth, Environmental and Planetary Sciences and helpful for determining an Area of Specialization.

Earth, Environmental and Planetary Sciences BA - Requirements

MATH 101 *or* MATH 105 Single Variable Calculus I *or* AP/OTH credit in Calculus I
 MATH 102 *or* MATH 106 Single Variable Calculus II *or* AP/OTH credit in Calculus II
 CHEM 121 *and* 123, 122 *and* 124* General Chemistry I *and* II with labs

Select 1 course from:

EEPS 101	The Earth
EEPS 107	Climate Change and Extreme Weather
EEPS 108	Natural Disasters
EEPS 109	Oceanography
EEPS 110	The Earth System, Environment and Society
EEPS 111	Inhabiting Planet Earth
EEPS 115	The Planets
EEPS 116	The Earth and the Solar System

EEPS 321	Earth and Planetary Surface Environments
EEPS 322	Earth and Planetary Chemistry and Materials
EEPS 323	Earth and Planetary Structure and Dynamics
EEPS 325	Oceans, Atmospheres and Climate
EEPS 334	The Earth Laboratory

Select 2-4 courses from either Group A or Group B:

Group A

Select 1 from:

BIOS 201 <i>and</i> BIOS 202	Introductory Biology I <i>and</i> Introductory Biology II
PHYS 101 <i>and</i> PHYS 103 <i>and</i> PHYS 102 <i>and</i> PHYS 104	Mechanics (with Lab) <i>and</i> Mechanics Discussion <i>and</i> Electricity & Magnetism (with Lab) <i>and</i> Electricity & Magnetism Discussion
PHYS 125 <i>and</i> PHYS 126	General Physics <i>and</i> General Physics II (with Labs)

Group B

Select 2 from the following Option Categories:

Option Category 1

Select 1 from:

PHYS 101 <i>and</i> PHYS 103	Mechanics (with Lab) <i>and</i> Mechanics Discussion
PHYS 125	General Physics (with Lab)
PHYS 102 <i>and</i> PHYS 104	Electricity & Magnetism (with Lab) <i>and</i> Electricity & Magnetism Discussion
PHYS 126	General Physics II (with Lab)

Option Category 2

BIOS 211 <i>and</i> BIOS 213	Intermediate Experimental Biosciences <i>and</i> Introductory Lab in Ecology and Evolution
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Option Category 3

MATH 211	Ordinary Differential Equations and Linear Algebra
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Option Category 4

EEPS 220 <i>or</i> CMOR 220	Introduction to Computation in EEPS <i>or</i> Introduction to Engineering Computation
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Select 4 EEPS course offerings at the 300-level or above

Select 2 courses from the School of Natural Sciences or the School of Engineering course offerings at the 200-level or above

* CHEM 111 *and* 113, 112 *and* 114 may substitute for CHEM 121 *and* 123, 122 *and* 124

Earth, Environmental and Planetary Sciences BA **SAMPLE DEGREE PLAN**

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		14 credits	FRESHMAN		14 credits
EEPS 1XX	100-level EEPS Course	3	EEPS 323	Earth Structure & Dynamics	4
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1			
SOPHOMORE		16 credits	SOPHOMORE		16 credits
EEPS 321	Earth System Environments	4	EEPS 325	Oceans, Atmospheres and Climate	4
ELECT	Elective Outside EEPS	3	ELECT	Elective Outside EEPS	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		16 credits	JUNIOR		15 credits
EEPS 322	Earth Chemistry & Materials	4	EEPS 334	The Earth Laboratory	3
EEPS 300+	EEPS Lecture	3	EEPS 300+	EEPS Lecture	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
EEPS 300+	EEPS Lecture	3	EEPS 300+	EEPS Lecture	3
NSCI/ENG	200+ level Elective	3	NSCI/ENG	200+ level Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Earth, Environmental and Planetary Sciences BS - Requirements

MATH 101 <i>or</i> MATH 105	Single Variable Calculus I <i>or</i> AP/OTH credit in Calculus I
MATH 102 <i>or</i> MATH 106	Single Variable Calculus II <i>or</i> AP/OTH credit in Calculus II
MATH 211	Ordinary Differential Equations and Linear Algebra
CHEM 121 <i>and</i> CHEM 123	General Chemistry I <i>and</i> General Chemistry Lab I <i>or</i>
<i>or</i> CHEM 111 <i>and</i> CHEM113	AP/OTH Credit in General Chem I <i>and</i> General Chem Lab I
CHEM 122 <i>and</i> CHEM 124	General Chemistry II <i>and</i> General Chemistry Lab II <i>or</i>
<i>or</i> CHEM 112 <i>and</i> CHEM 114	AP/OTH credit in General Chem II <i>and</i> General Chem Lab II
<i>Select 1 from:</i>	
PHYS 101 <i>and</i> PHYS 103	Honors Mechanics (with lab) <i>and</i> Mechanics Discussion
PHYS 111	Honors Mechanics (with lab)
<i>Select 1 from:</i>	
PHYS 102 <i>and</i> PHYS 104	Electricity & Magnetism (with Lab) <i>and</i> E&M Discussion
PHYS 112	Honors Electricity and Magnetism (with Lab)
<i>Select 1 from:</i>	
EEPS 101	The Earth
EEPS 107	Climate Change and Extreme Weather
EEPS 108	Natural Disasters
EEPS 109	Oceanography
EEPS 110	The Earth System, Environment and Society
EEPS 111	Inhabiting Planet Earth
EEPS 115	The Planets
EEPS 116	The Earth and the Solar System
<i>Select 1 from:</i>	
EEPS 220	Introduction to Computation in EEPS
<i>or</i> CMOR 220	<i>or</i> Introduction to Engineering Computation
EEPS 321	Earth and Planetary Surface Environments
EEPS 322	Earth and Planetary Chemistry and Materials
EEPS 323	Earth and Planetary Structure and Dynamics
EEPS 325	Oceans, Atmospheres and Climate
EEPS 334	The Earth Laboratory

Students must complete one of the following areas of specialization.

Area of Specialization: Environmental Earth Science

Select at least 1 course from each of the following 5 fields (see 2023 GA for course lists):

- Breadth in Environmental Science
- Climate, Atmosphere, and Water
- Environmental Geochemistry and Geophysics
- Modeling and Data Analysis
- Surface Processes

continued

Earth, Environmental and Planetary Sciences BS - Requirements

Area of Specialization: Environmental Earth Science *continued*

Select a minimum of 2 courses from:

Any course from EEPS course offerings between course numbers EEPS 407: 480, EEPS 482: 490, EEPS 492: 499

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Discussion I
EEPS 390 <i>or</i> EEPS 391	Geology Field Camp <i>or</i> Earth Science Field Experience
MATH 212 <i>or</i> MATH 232	Multivariable Calculus <i>or</i> Honors Multivariable Calculus
PHYS 201	Waves, Light, and Heat
STAT 280 <i>or</i> STAT 180	Elementary Applied Statistics <i>or</i> AP/OTH Credit in Statistics

Any course at the 300-level or above from the following subject codes:

BIOS, CEVE, CHEM, CMOR, ENVS, MATH, MECH, PHYS, or STAT

Area of Specialization: Geoscience

Select at least 1 course from each of the following 5 fields (see 2023 GA for course lists):

Deformation and Dynamics

Geophysics

Modeling and Data Analysis

Petrology, Geochemistry, and Materials Characterization

Surface Processes

Select a minimum of 2 courses from:

Any course from EEPS course offerings between course numbers EEPS 407: 480, EEPS 482: 490, EEPS 492: 499

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
BIOS 211	Intermediate Experimental Biosciences
CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Discussion
EEPS 390 <i>or</i> EEPS 391	Geology Field Camp <i>or</i> Earth Science Field Experience
MATH 212 <i>or</i> MATH 232	Multivariable Calculus <i>or</i> Honors Multivariable Calculus
PHYS 201	Waves, Light, and Heat
STAT 280 <i>or</i> STAT 180	Elementary Applied Statistics <i>or</i> AP/OTH Credit in Statistics

Any course at the 300-level or above from the following subject codes:

BIOS, CEVE, CHEM, CMOR, ENVS, MATH, MECH, PHYS, or STAT

Earth, Environmental and Planetary Sciences BS - Requirements

Area of Specialization: Planetary Science

Select at least 1 course from each of the following 5 fields (see 2023 GA for course lists):

Breadth in Planetary Sciences

Deformation and Dynamics

Modeling and Data Analysis

Petrology, Geochemistry, and Materials Characterization

Surface Processes

Select a minimum of 2 courses from:

Any course from EEPS course offerings between course numbers EEPS 407: 480,
EEPS 482: 490, EEPS 492: 499

EEPS 390 or EEPS 391 Geology Field Camp or Earth Science Field
Experience

MATH 212 or MATH 232 Multivariable Calculus or Honors Multivariable
Calculus

PHYS 201 Waves, Light, and Heat

PHYS 231 Elementary Physics Lab

STAT 280 Elementary Applied Statistics
or STAT 180 or AP/OTH Credit in Statistics

Any course at the 300-level (or above) from the following subject codes:
ASTR, CHEM, CMOR, MATH, MECH, PHYS, or STAT

Earth, Environmental and Planetary Sciences BS **SAMPLE DEGREE PLAN**

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		14 credits	FRESHMAN		14 credits
EEPS 1XX	100-level EEPS Course	3	EEPS 323	Earth Structure & Dynamics	4
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1			
SOPHOMORE		14 credits	SOPHOMORE		14 credits
EEPS 321	Earth Surface Environments	4	EEPS 325	Oceans, Atmospheres and Climate	4
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
CMOR 220	Intro to Engineering Computation	3	MATH 211	Ord Differential Equations and Linear Algebra	3
ELECT	Specialization	3	DIST	Distribution Course	3
JUNIOR		15 credits	JUNIOR		15 credits
EEPS 322	Earth Chemistry & Materials	4	EEPS 334	The Earth Laboratory	3
ELECT	Specialization	4	ELECT	Specialization	3
DIST	Distribution Course	3	ELECT	Specialization	3
OPEN	Open Elective	3	DIST	Distribution Course	3
COLL	College Course	1	OPEN	Open Elective	3
JUNIOR	SUMMER	3 credits			
EEPS 390 or EEPS 391	Geology Field Camp	3			
SENIOR		16 credits	SENIOR		15 credits
ELECT	Specialization	4	ELECT	Specialization	3
ELECT	Specialization	3	ELECT	Specialization	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Earth, Environmental and Planetary Sciences Minor - Requirements

Select 1 course from:

EEPS 101	The Earth
EEPS 107	Climate Change and Extreme Weather
EEPS 108	Natural Disasters
EEPS 109	Oceanography
EEPS 110	The Earth System, Environment, and Society
EEPS 111	Inhabiting Planet Earth
EEPS 115	The Planets
EEPS 116	The Earth and Solar System

Select 2 courses from:

EEPS 321	Earth and Planetary Surface Environments
EEPS 322	Earth and Planetary Chemistry and Materials
EEPS 323	Earth and Planetary Structure and Dynamics
EEPS 325	Oceans, Atmospheres and Climate
EEPS 334	The Earth Laboratory

Select 3 courses from EEPS course offerings at the 300-level or above

ENVIRONMENTAL SCIENCE

The Environmental Science degree is jointly offered by the Department of Biosciences and the Department of Earth, Environmental and Planetary Sciences. It is designed to help students understand environmental issues from a scientific perspective and be able to solve issues using a variety of interdisciplinary perspectives.

The interdisciplinary Environmental Science BA and BS degree paths explore interconnections between humans and the natural environment, drawing courses from Biosciences; Earth, Environmental and Planetary Sciences; Civil and Environmental Engineering; and across Humanities, Architecture and Social Sciences. This program is designed to foster the critical thinking required to address the increasing complexities facing our planet.

Degrees Offered

Environmental Science BA, BS

Frank Advice

- The Environmental Science major addresses environmental issues in the context of what we know about Earth sciences, biology and society. Students declare a concentration in either ecology and evolutionary biology or Earth, environmental and planetary sciences. Upper-level major courses reflect students' chosen concentrations and include an affiliation with the relevant department (Biosciences or Earth, Environmental and Planetary Sciences). The major includes strong connections to the Humanities and Social Sciences.

ENVIRONMENTAL SCIENCE

Environmental Science BA - Requirements

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
BIOS 332	Ecology
CHEM 121 & 123, 122 & 124 or CHEM 111 & 113, 112 & 114	General Chemistry I <i>and</i> II <i>and</i> General Chemistry Lab I <i>and</i> II or AP/OTH Credit in General Chemistry I and II <i>and</i> General Chemistry Lab I <i>and</i> II
MATH 101 <i>or</i> MATH 105 MATH 102 <i>or</i> MATH 106 STAT 280 <i>or</i> STAT 305	Single Variable Calculus I <i>or</i> AP/OTH credit in Calculus I Single Variable Calculus II <i>or</i> AP/OTH credit in Calculus II Elementary Applied Statistics <i>or</i> Introduction to Statistics for Biosciences
BIOS 213	Introductory Lab in Ecology and Evolution
ENST 100/ARCH 105	Environment, Culture and Society
Any 3 credit EEPS course offering at the 100-level	
EEPS 321	Earth and Planetary Surface Environments
EEPS 325	Oceans, Atmospheres and Climate

Select 1-2 courses (2-3 credit hours) from the Field Experience list in the 2023 GA

Select 1 advanced Social Sciences Elective from the list in the 2023 GA

Select 1 advanced Humanities and Architecture Elective from the list in the 2023 GA

Select 1 advanced Natural Sciences and Engineering Elective from the list in the 2023 GA

BIOS 495/EEPS 495	Seminar: Topics in Environmental Science
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Students must complete the requirements for one major concentration.

Major Concentration: Earth Science

Select 2 courses from:

EEPS 220	Intro to Computation in EEPS
EEPS 322	Earth and Planetary Chemistry and Materials
EEPS 323	Earth and Planetary Structure and Dynamics
EEPS 340	Global Biogeochemical Cycles

Select 1 course from the Elective Requirement list for the Major Concentration in Earth Science in the 2023 GA (Courses previously used to meet Core Requirements cannot be counted a second time as an elective)

Environmental Science BA - Requirements

Major Concentration: Ecology and Evolutionary Biology

Select 2 courses from:

BIOS 271	Environmental Management
BIOS 373	Coral Reef Ecosystems
BIOS 374	Global Change Biology
BIOS 423	Conservation Biology

Select at least 1 course from:

BIOS 321	Animal Behavior
BIOS 326	Insect Biology
BIOS 334	Evolution
BIOS 336	Plant Diversity
BIOS 338	Analysis and Visualization of Biological Data
BIOS 373	Coral Reef Ecosystems
BIOS 423	Conservation Biology
BIOS 431	Biology of Infectious Diseases
EEPS 340	Global Biogeochemical Cycles

Environmental Science BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		16 credits	FRESHMAN		14 credits
BIOS 201	Introductory Biology I	3	BIOS 202	Introductory Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	DIST	Distribution Course	3
SOPHOMORE		14 credits	SOPHOMORE		16 credits
BIOS 213	Intro Lab in Ecology & Evolutionary Biology	2	EEPS 325	Oceans, Atmospheres and Climate	4
BIOS 332	Ecology	3	STAT 305	Intro to Statistics for Biosciences	4
ENST 100	Environment, Culture and Society	3	FIELD	Field Experience	2
EEPS 1XX	100-level EEPS course	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
JUNIOR		16 credits	JUNIOR		15 credits
EEPS 321	Earth and Planetary Surface Environments	4	FIELD	Field Experience	3
SOSCI	Social Sciences Elective	3	NSCI	Natural Sciences & Engineering Elective	3
HUMA	Humanities and Architecture Elective	3	CONC	Major Concentration	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
CONC	Major Concentration	3	CONC	Major Concentration	3
CONC	Major Concentration	3	CONC	Major Concentration	3
CONC	Major Concentration	3	EEPS 495	Capstone Senior Seminar	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Environmental Science BS - Requirements

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
BIOS 332	Ecology
CHEM 121 & 123, 122 & 124 or CHEM 111 & 113, 112 & 114	General Chemistry I <i>and</i> II <i>and</i> General Chemistry Lab I <i>and</i> II or AP/OTH Credit in General Chemistry I and II <i>and</i> General Chemistry Lab I <i>and</i> II
MATH 101 or MATH 105	Single Variable Calculus I or AP/OTH credit in Calculus I
MATH 102 or MATH 106	Single Variable Calculus II or AP/OTH credit in Calculus II
STAT 280 or STAT 305	Elementary Applied Statistics or Introduction to Statistics for Biosciences

Select 1 from:

PHYS 101 <i>and</i> PHYS 103	Mechanics (with lab) <i>and</i> Mechanics Discussion
PHYS 111	Honors Mechanics (with lab)
PHYS 125	General Physics (with lab)

Select 1 course (3-4 credit hours) from the Data and Quantitation list in the 2023 GA

BIOS 213	Introductory Lab in Ecology and Evolution
ENST 100/ARCH 105	Environment, Culture and Society
Any 3 credit EEPS course offering at the 100-level	
EEPS 321	Earth and Planetary Surface Environments
EEPS 325	Oceans, Atmospheres and Climate

Select 1-2 courses (2-3 credit hours) from the Field Experience list in the 2023 GA

Select 1 advanced Social Sciences Elective from the list in the 2023 GA

Select 1 advanced Humanities and Architecture Elective from the list in the 2023 GA

Select 1 advanced Natural Sciences and Engineering Elective from the list in the 2023 GA

Select 1 course from:

BIOS 310	Independent Research for Bios. Undergraduates
BIOS 401	Undergraduate Honors Research
EEPS 390	Geology Field Camp
EEPS 391	Earth Science Field Experience
EEPS 481	Undergraduate Research in Earth Science

BIOS 495/EEPS 495 Seminar: Topics in Environmental Science

Environmental Science BS - Requirements

Students must complete the requirements for one major concentration.

Major Concentration: Earth Science

Select 2 courses from:

EEPS 220	Intro to Computation in EEPS
EEPS 322	Earth and Planetary Chemistry and Materials
EEPS 323	Earth and Planetary Structure and Dynamics
EEPS 340	Global Biogeochemical Cycles

Select 1 course from the Elective Requirement list for the Major Concentration in Earth Science in the 2023 GA (Courses previously used to meet Core Requirements cannot be counted a second time as an elective)

Major Concentration: Ecology and Evolutionary Biology

Select 2 courses from:

BIOS 271	Environmental Management
BIOS 373	Coral Reef Ecosystems
BIOS 374	Global Change Biology
BIOS 423	Conservation Biology

Select at least 1 course from:

BIOS 321	Animal Behavior
BIOS 326	Insect Biology
BIOS 334	Evolution
BIOS 336	Plant Diversity
BIOS 338	Analysis and Visualization of Biological Data
BIOS 373	Coral Reef Ecosystems
BIOS 423	Conservation Biology
BIOS 431	Biology of Infectious Diseases
EEPS 340	Global Biogeochemical Cycles

Environmental Science BS

SAMPLE DEGREE PLAN

Major Concentration: Ecology and Evolutionary Biology

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		16 credits	FRESHMAN		14 credits
BIOS 201	Introductory Biology	3	BIOS 202	Introductory Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	DIST	Distribution Course	3
SOPHOMORE		15 credits	SOPHOMORE		15 credits
BIOS 213	Intro Lab in Ecology and Evolutionary Biology	2	EEPS 100-199	100-level EEPS Course	3
BIOS 332	Ecology	3	CONC	Major Concentration	3
ENST 100	Environment, Culture and Society	3	PHYS 126	General Physics II (with lab)	4
PHYS 125	General Physics (with lab)	4	FIELD	Field Experience	2
DIST	Distribution Course	3	DIST	Distribution Course	3
JUNIOR		14 credits	JUNIOR		16 credits
EEPS 321	Earth and Planetary Surface Environments	4	EEPS 325	Oceans, Atmospheres and Climate	4
SOSCI	Social Science Elective	3	HUMA	Humanities & Architecture Elec	3
STAT 305	Intro to Statistics for Biosciences	4	BIOS 373	Coral Reef Ecosystems	3
RESEARCH	Research Experience Requirement	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
BIOS 423	Conservation Biology	3	NSCI	Natural Sciences and Engineering Elective	3
CONC	Major Concentration	3	BIOS 495	Capstone Senior Seminar	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

KINESIOLOGY

The Kinesiology department is home to two academic majors: Health Sciences and Sports Medicine and Exercise Physiology. Flexible curricula permit undergraduate majors to tailor their coursework to their particular postgraduate needs and also permit them to study abroad, pursue internships and conduct undergraduate research. With a median class size of 19, students find an active, close-knit community of scholars, teachers and mentors who take a personal interest in every student major. The Kinesiology programs have one of the largest number of academic majors in the School of Natural Sciences and are among the largest choice of student majors at Rice.

The Health Sciences major provides students with a fundamental background in health promotion and disease prevention. Viewing health from the broader community level, students acquire the knowledge and skills for careers in public health related positions.

The Sports Medicine and Exercise Physiology major provides a strong basic science foundation and then interfaces this foundation with application to the human body. It is the only academic specialization on campus that provides detailed instruction in human anatomy and human physiology in addition to nutrition, biomechanics, motor learning and exercise physiology among other topics.

Degrees Offered

Health Sciences	BA
Sports Medicine and Exercise Physiology	BA

KINESIOLOGY

Frank Advice

- Pre-health professions students choosing to major in either Health Sciences or Sports Medicine and Exercise Physiology should consult with one of the department advisors for your major as well as the Health Professions Advising service to ensure that you are choosing the correct pre-requisites as you are planning your degree.
- Be mindful when degree planning of courses that may only be offered once per academic year.
- New majors or those interested in the field are encouraged to enroll in KINE 120 (Scientific Foundations of Kinesiology) if interested in Sports Medicine and Exercise Physiology or HEAL 222 (Principles of Public and Community Health) or HEAL 119 (Introduction to Health and Wellness) if interested in Health Sciences prior to upper-level courses to gain an understanding of the majors. HEAL 132 (Medical Terminology) is recommended prior to KINE 300 (Human Anatomy) or KINE 301 (Human Physiology.)
- Qualified students are encouraged to participate in independent research. This independent research allows integral involvement in basic or applied research directed by a faculty advisor. Opportunities are available with a variety of institutions in the Texas Medical Center as well as within the department.
- Students are encouraged to pursue any of a variety of highly competitive internships, which provide practical experience tailored to your interests. The close proximity of Rice to the Texas Medical Center allows you to find experience in a research or medical setting for potentially every aspect of health or medicine.

Health Sciences BA - Core Requirements

HEAL 222	Principles of Public and Community Health
HEAL 313	Foundations of Health Promotion and Education
HEAL 407	Epidemiology
HEAL 422	Theories and Models of Health Behavior
HEAL 460	Planning and Evaluation of Health Promotion and Education
KINE 319	Statistics for the Health Professional

Select 8 courses from the Elective Requirements list in the 2023 GA

Health Sciences BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		15 credits	FRESHMAN		16 credits
HEAL 119	Introduction to Health & Wellness	3	ELECT	Health Sciences Elective	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SOPHOMORE		15 credits	SOPHOMORE		15 credits
HEAL 222	Principles of Public & Community Health	3	ELECT	Health Sciences Elective	3
KINE 319	Statistics for the Health Professional	3	ELECT	Health Sciences Elective	3
ELECT	Health Sciences Elective	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		15 credits	JUNIOR		15 credits
HEAL 407	Epidemiology	3	HEAL 422	Theories & Models of Health Behavior	3
ELECT	Health Sciences Elective	3	HEAL 313	Foundations of Health Promotion & Education	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
HEAL 460	Planning & Evaluation of Health Promotion & Education	3	ELECT	Health Sciences Elective	3
ELECT	Health Sciences Elective	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Sports Medicine and Exercise Physiology BA - Core Requirements

HEAL 103	Nutrition
KINE 300	Human Anatomy with Lab
KINE 301	Human Physiology
KINE 302	Biomechanics
KINE 310	Psychological Aspects of Sport and Exercise
KINE 311	Motor Learning
KINE 319	Statistics for the Health Professional
KINE 321	Exercise Physiology
KINE 440	Research Methods

Select 5 courses from the Elective Requirements list in the 2023 GA

Sports Medicine and Exercise Physiology BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		15 credits	FRESHMAN		16 credits
HEAL 103	Nutrition	3	ELECT	Kinesiology Elective	3
KINE 120	Foundations of Kinesiology (Elective)	3	LPAP	Lifetime Physical Activity Elective	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SOPHOMORE		15 credits	SOPHOMORE		15 credits
KINE 319	Statistics for the Health Professional	3	KINE 301	Human Physiology	3
ELECT	Kinesiology Elective	3	ELECT	Kinesiology Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		16 credits	JUNIOR		15 credits
KINE 300	Human Anatomy & Lab	4	KINE 302	Biomechanics	3
ELECT	Kinesiology Elective	3	KINE 321	Exercise Physiology	3
DIST	Distribution Course	3	KINE 440	Research Methods	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
KINE 311	Motor Learning	3	KINE 310	Psychological Aspects of Sport and Exercise	3
ELECT	Kinesiology Elective	3	ELECT	Kinesiology Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

MATHEMATICS

Mathematics is not just about numbers; it is the study of structures and patterns that, while abstract, provide a language and a toolkit for interpreting our world. The Mathematics Department offers courses in the traditional areas of pure mathematics: analysis, algebra, geometry and topology, as well as classes in such areas as combinatorics, dynamical systems and probability. Undergraduates seeking a math degree receive training in problem solving, analytical thinking and the logical and precise communication of their ideas. It is precisely these skills that make math majors a valuable commodity everywhere, from industry to law to finance, plus many academic fields beyond math.

The BS program prepares students for PhD programs in mathematics and related disciplines. It requires courses from each of the subfields of mathematics.

The BA program is quite flexible, and is even more flexible for students pursuing another major with math — a popular choice! Today's budding scientist, engineer, computer scientist, economist or social scientist needs much more mathematical training than did previous generations. The ease and flexibility of the double major in math allows students to get degree credit for their work.

Degrees Offered

Mathematics

BA, BS, Minor

MATHEMATICS

Frank Advice

- The Math Department website provides detailed information about choosing the proper math course for your first semester at Rice. See <https://math.rice.edu/which-courses-should-i-take> for advice on class selection for first-year students.
- If you have AP credit for MATH 101-102, have a strong math background, and are interested in a major with a substantial math component, consider taking Honors Linear Algebra (MATH 354), Honors Multivariable Calculus (MATH 232) and/or Honors Differential Equations (MATH 220). These get more into theoretical aspects of math and also emphasize writing clear and precise mathematical arguments.
- You should also consider Research Experiences for Undergraduates and other summer research programs if you are thinking of applying to graduate school in Math. (see: www.ams.org/programs/students/emp-reu for more information)
- Not required but highly-recommended courses:
 - MATH 232 – Honors Multivariable Calculus
 - MATH 290 – Mathematical Writing Seminar
 - MATH 354 – Honors Linear Algebra
 - MATH 321 – Introduction to Analysis I
 - MATH 356 – Abstract Algebra I

Mathematics BA - Requirements

MATH 101 *or* MATH 105 Single Variable Calculus I *or* AP/OTH credit in Calculus I
 MATH 102 *or* MATH 106 Single Variable Calculus II *or* AP/OTH credit in Calculus II

Select 1 from:

MATH 211 <i>and</i> MATH 212	Ordinary Differential Equations and Linear Algebra <i>and</i> Multivariable Calculus
MATH 211 <i>and</i> MATH 222	Ordinary Differential Equations and Linear Algebra <i>and</i> Honors Calculus IV
MATH 211 <i>and</i> MATH 232	Ordinary Differential Equations and Linear Algebra <i>and</i> Honors Multivariable Calculus
MATH 220 <i>and</i> MATH 212	Honors Ordinary Differential Equations <i>and</i> Multivariable Calculus
MATH 220 <i>and</i> MATH 222	Honors Ordinary Differential Equations <i>and</i> Honors Calculus IV
MATH 220 <i>and</i> MATH 232	Honors Ordinary Differential Equations <i>and</i> Honors Multivariable Calculus
MATH 221 <i>and</i> MATH 222	Honors Calculus III <i>and</i> Honors Calculus IV

Select 8 courses from MATH course offerings at the 300-level or above

Mathematics BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		15 credits	FRESHMAN		16 credits
MATH 101	Single Variable Calculus	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
DIST	Distribution Course	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SOPHOMORE		15 credits	SOPHOMORE		15 credits
MATH 211 or MATH 354	Ordinary Differential Equations and Linear Algebra or Honors Linear Algebra	3	MATH 212 or MATH 232	Multivariable Calculus or Honors Multivariable Calculus	3
DIST	Distribution Course	3	MATH 354 or MATH 300+	Honors Linear Algebra or Math Elective	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		15 credits	JUNIOR		15 credits
MATH 356	Abstract Algebra I	3	MATH 321	Intro to Analysis I	3
MATH 300+	Math Elective	3	MATH 300+	Math Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
MATH 300+	Math Elective	3	MATH 300+	Math Elective	3
MATH 300+	Math Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Mathematics BS - Requirements

MATH 101 or MATH 105 Single Variable Calculus I or AP/OTH credit in Calculus I
 MATH 102 or MATH 106 Single Variable Calculus II or AP/OTH credit in Calculus II

Select 1 course from:

MATH 211	Ordinary Differential Equations and Linear Algebra
MATH 220	Honors Ordinary Differential Equations
MATH 381	Introduction to Partial Differential Equations
MATH 423/CMOR 405	Partial Differential Equations I

Select 1 from:

MATH 212	Multivariable Calculus
MATH 221 and MATH 222	Honors Calculus III and Honors Calculus IV
MATH 232	Honors Multivariable Calculus
MATH 322	Introduction to Analysis II
MATH 370	Calculus on Manifolds

Select 1 course from:

MATH 221	Honors Calculus III
MATH 354	Honors Linear Algebra
MATH 355	Linear Algebra

Select 2 courses from:

MATH 321	Introduction to Analysis I
MATH 322	Introduction to Analysis II
MATH 331	Honors Analysis
MATH 425	Integration Theory

Select 2 courses from:

MATH 356	Abstract Algebra I
MATH 357	Abstract Algebra II
MATH 463	Advanced Algebra I

Select 1 course from:

MATH 370	Calculus on Manifolds
MATH 401	Differential Geometry of Curves and Surfaces
MATH 402	Differential Geometry
MATH 451	Differentiable Manifolds
MATH 452	Riemannian Geometry

MATH 382 or MATH 427 Computational Complex Analysis or Complex Analysis

Select 1 course from:

MATH 443	General Topology
MATH 444	Geometric Topology
MATH 445	Algebraic Topology

Students must complete a minimum of 33 credit hours from MATH course offerings at the 300-level or above

Mathematics BS

SAMPLE DEGREE PLAN

This sample plan assumes AP credit.

This is **only one** of many possible ways to fulfill your degree requirements.

FALL			SPRING		
FRESHMAN			FRESHMAN		
		16 credits			16 credits
MATH 354	Honors Linear Algebra	3	MATH 232	Honors Multivariable Calculus	3
MATH 290	Foundations of Mathematical Writing	1	DIST	Distribution Course	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SOPHOMORE			SOPHOMORE		
		15 credits			15 credits
MATH 321	Intro to Analysis I	3	MATH 322	Intro to Analysis II	3
DIST	Distribution Course	3	MATH 300+	Math Elective	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR			JUNIOR		
		15 credits			15 credits
MATH 356	Abstract Algebra I	3	MATH 357	Abstract Algebra II	3
MATH 423	Partial Differential Equations I	3	MATH 443	General Topology	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR			SENIOR		
		15 credits			15 credits
MATH 370	Calculus on Manifolds	3	MATH 427	Complex Analysis	3
MATH 300+	Math Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Mathematics Minor - Requirements

Select 1 from:

MATH 302	Elements of Analysis
MATH 321	Introduction to Analysis I
MATH 331	Honors Analysis
MATH 381	Introduction to Partial Differential Equations
MATH 382	Computational Complex Analysis

Select 1 from:

MATH 306	Elements of Abstract Algebra
MATH 356	Abstract Algebra I
MATH 365	Number Theory
MATH 368	Topics in Combinatorics

Select 1 from:

MATH 221	Honors Calculus III
MATH 354	Honors Linear Algebra
MATH 355	Linear Algebra

Select 3 additional courses from MATH course offerings

NEUROSCIENCE

Both the Neuroscience BA and BS degrees are interdisciplinary programs designed to provide multiple paths for students interested in the brain and how it works. The BA degree provides a general overview of all facets of neuroscience, while the BS degree has two tracks that allow students to specialize in either Molecular and Cellular Neuroscience or Computational Neuroscience. Regardless of the degree path, students will explore the biological basis of cognition, how information is processed by neurons and neural systems and how the latest mathematical and scientific tools can be utilized to learn more about ourselves. Research experiences are highly encouraged with professors at Rice and across the street in the Texas Medical Center.

For those who are interested in neuroscience but do not wish to major in the field, there is an associated minor with two tracks to choose from: Humanities and Social Sciences and Natural Sciences and Engineering. Each track involves taking a selection of core and elective courses selected from the above majors and allows for research to count for credit towards the minor.

Degrees Offered

Neuroscience	BA, BS, Minor
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Frank Advice

- Our website (www.neuroscience.rice.edu) contains degree requirements, possible pathways for the degrees, lists and contact information of the major/minor advisors, links to student organizations and suggestions on how to get into research.
- NEUR 310 gives credit for Independent Research. The course can be taken twice for both the major and minor (talk with an advisor on how this is done). However, students can, and often do, repeat the course for additional general elective credit and to gain real world lab experience. It is fine to do research in different labs, but we suggest that you stick with a lab for multiple semesters to accomplish projects and potentially publish scientific journal articles.
- Programming is an important skill in any modern science. For the major, CMOR 220 or COMP 140 are required and act as an introduction to coding for many students. We suggest taking this early in your undergraduate career so that you have longer to use the skills you develop in the course (e.g., doing data analysis while working in a lab for NEUR 310).

Neuroscience BA - Requirements

BIOS 201	Introductory Biology I
CMOR 220	Introduction to Engineering Computation
CHEM 121 <i>and</i> CHEM 123 <i>or</i> CHEM 111 <i>and</i> CHEM 113	General Chemistry I <i>and</i> General Chemistry Lab I <i>or</i> AP/OTH Credit in General Chemistry I <i>and</i> Lab
CHEM 122 <i>and</i> CHEM 124 <i>or</i> CHEM 112 <i>and</i> CHEM 114	General Chemistry II <i>and</i> General Chemistry Lab II <i>or</i> AP/OTH Credit in General Chemistry II <i>and</i> Lab
MATH 101 <i>or</i> MATH 105*	Single Variable Calculus I <i>or</i> AP/OTH credit in Calculus I
MATH 102 <i>or</i> MATH 106	Single Variable Calculus II <i>or</i> AP/OTH credit in Calculus II
PHYS 125*	General Physics (with lab)
PHYS 126*	General Physics II (with lab)
PSYC 203	Introduction to Cognitive Psychology

Select 1 course from:

STAT 305	Introduction to Statistics for Biosciences
STAT 310/ECON 307	Probability and Statistics
STAT 312	Probability and Statistics for Engineers
STAT 315/DSCI 301	Probability and Statistics for Data Science

BIOS 385	Cellular and Molecular Mechanisms of the Neuron
NEUR 362/PSYC 362	Cognitive Neuroscience: Exploring the Living Brain
NEUR 380/PSYC 380	Fundamental Neuroscience Systems
NEUR 383/BIOE 380/ELEC 380	Introduction to Neuroengineering: Measuring and Manipulating Neural Activity
BIOS 212	Intermediate Experimental Cellular and Molecular Neuroscience

Select a minimum of 2 courses (minimum of 2 credit hours) from:

BIOS 315	Experimental Physiology
BIOS 417	Experimental Cell and Molecular Neuroscience
NEUR 310*	Indep. Research for Neuroscience Undergraduates
PSYC 366	Methods in Social Cognitive and Affective Neuroscience
PSYC 487	Functional Human Neuroanatomy

Select 4 courses from the Elective Requirements list in the 2023 GA

* MATH 111 *and* MATH 112 may be substituted for MATH 101 *or* MATH 105

PHYS 101 *and* PHYS 103 *or* PHYS 111 may be substituted for PHYS 125

PHYS 102 *and* PHYS 104 *or* PHYS 112 may be substituted for PHYS 126

Students must complete a minimum of three semesters of BIOS 128 (3 credit hours total) to use this course to fulfill an elective requirement

NEUR 310 can be repeated and counted as an elective if a student has chosen NEUR 310 to count as a Project-based Laboratory Course

Neuroscience BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN			FRESHMAN		
		13 credits			14 credits
BIOS 201	Intro Biology	3	PSYC 203	Intro to Cognitive Science	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Act. Elective	1
			DIST	Distribution Course	3
SOPHOMORE			SOPHOMORE		
		15 credits			17 credits
CMOR 220	Intro to Engineering Computation	3	STAT 305	Intro to Stat for Biosciences	4
BIOS 212	Intermediate Exptl. Neuro.	2	NEUR 380	Fund. Neuroscience Systems	3
PHYS 125	General Physics (with lab)	4	PHYS 126	General Physics II (with lab)	4
BIOS 385	Fund. Cellular/Molecular Neuro.	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR			JUNIOR		
		16 credits			16 credits
LAB	Required Lab	1	ELECT	Required Elective Course	3
NEUR 383	Intro to Neuroengineering	3	NEUR 362	Cognitive Neuroscience	3
DIST	Distribution Course	3	LAB	Required Lab	1
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR			SENIOR		
		15 credits			15 credits
ELECT	Required Elective Course	3	ELECT	Required Elective Course	3
DIST	Distribution Course	3	ELECT	Required Elective Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Neuroscience BS - Requirements

BIOS 201	Introductory Biology I
CHEM 121 or CHEM 111	General Chemistry I or AP/OTH credit in General Chemistry
CHEM 123 or CHEM 113	General Chemistry Laboratory I or AP/OTH credit in General Chemistry Lab I
MATH 101 or MATH 105	Single Variable Calculus I or AP/OTH credit in Calculus I
MATH 102 or MATH 106	Single Variable Calculus II or AP/OTH credit in Calculus II
PHYS 125*	General Physics (with lab)
PHYS 126*	General Physics II (with lab)
PSYC 203	Introduction to Cognitive Psychology
CMOR 220 or COMP 140	Intro to Engineering Computation or Computational Thinking

Select 1 from:

STAT 305	Introduction to Statistics for Biosciences
STAT 310/ECON 307	Probability and Statistics
STAT 315	Probability and Statistics for Data Science

BIOS 385	Cellular and Molecular Mechanisms of the Neuron
NEUR 362/PSYC 362	Cognitive Neuroscience: Exploring the Living Brain
NEUR 380	Fundamental Neuroscience Systems
NEUR 383/BIOE 380/ELEC 380	Intro to Neuroengineering: Measuring and Manipulating Neural Activity

BIOS 212	Intermediate Experimental Cellular and Molecular Neuroscience
NEUR 310	Independent Research for Neuroscience Undergraduates

Select 1 from:

BIOS 315	Experimental Physiology
BIOS 417	Experimental Cell and Molecular Neuroscience
PSYC 366	Methods in Social Cognitive and Affective Neuroscience
PSYC 487	Functional Human Neuroanatomy

Students must complete coursework that satisfies the requirements of one major concentration.

Major Concentration in Computational Neuroscience

ELEC 240	Fundamentals of Electrical Engineering I Laboratory
ELEC 241	Fundamentals of Electrical Engineering I
MATH 211	Ordinary Differential Equations and Linear Algebra
MATH 355*	Linear Algebra
NEUR 415/CMOR 415/ELEC 488	Theoretical Neuroscience: From Cells to Learning Systems
NEUR 416/CMOR 416/ELEC 489	Neural Computation

Select 2 courses from the Elective Requirements list for the Major Concentration in Computational Neuroscience in the 2023 GA

(continued)

Neuroscience BS

Major Concentration in Computational Neuroscience *(continued)*

Select 1 from:

BIOS 442	Molecules, Memory and Model Animals: Methods in Behavioral Neuroscience
BIOS 443	Developmental Neurobiology
BIOS 449	Advanced Cell and Molecular Neuroscience

Major Concentration in Molecular and Cellular Neuroscience

BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 344	Molecular Biology and Genetics
CHEM 122 or CHEM 112	General Chemistry II or AP/OTH credit in General Chemistry II
CHEM 124 or CHEM 114	General Chemistry Laboratory II or AP/OTH credit in General Chemistry Lab II
CHEM 211 & CHEM 213	Organic Chemistry I and Organic Chemistry Discussion I

Select 2 courses from the Elective Lecture Courses list for the Major Concentration in Molecular and Cellular Neuroscience in the 2023 GA

Select 1 from:

BIOS 442	Molecules, Memory and Model Animals: Methods in Behavioral Neuroscience
BIOS 443	Developmental Neurobiology
BIOS 449	Advanced Cell and Molecular Neuroscience

* MATH 111 and MATH 112 may be substituted for MATH 101 or MATH 105

PHYS 101 and PHYS 103 or PHYS 111 may be substituted for PHYS 125

PHYS 102 and PHYS 104 or PHYS 112 may be substituted for PHYS 126

MATH 354 may be substituted for MATH 355

Students must complete a minimum of three semesters of BIOS 128 (3 credit hours total) to use this course to fulfill an elective requirement

NEUR 310 can be repeated and counted as an elective if a student has chosen NEUR 310 to count as a Project-based Laboratory Course

SAMPLE DEGREE PLAN

Neuroscience BS - Major Concentration in Computational Neuroscience

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN		15 credits	FRESHMAN		16 credits
BIOS 201	Intro Biology I	3	CMOR 210	Intro to Engineering Computation	3
PSYC 203	Intro to Cognitive Psychology	3	MATH 102	Single Variable Calculus II	3
MATH 101	Single Variable Calculus I	3	LPAP	Lifetime Physical Activity Elective	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SOPHOMORE		15 credits	SOPHOMORE		14 credits
BIOS 385	Fund. Cellular/Molecular Neuro.	3	STAT 305	Intro to Stat for Biosciences	4
BIOS 212	Intermediate Exptl. Neuro.	2	NEUR 380	Fund. Neuroscience Systems	3
PHYS 125	General Physics (with lab)	4	PHYS 126	General Physics II (with lab)	4
MATH 211	Ordinary Differential Equations	3	MATH 355	Linear Algebra	3
DIST	Distribution Course	3			
JUNIOR		14 credits	JUNIOR		15 credits
NEUR 310	Ind. Research in Neuroscience	3	ELECT	Required Elective Course	3
LAB	Required Lab	1	NEUR 362	Cognitive Neuroscience	3
NEUR 383	Intro to Neuroengineering	3	DIST	Distribution Course	3
CHEM 121	General Chemistry I	3	OPEN	Open Elective	3
CHEM 123	General Chemistry Lab I	1	OPEN	Open Elective	3
OPEN	Open Elective	3			
SENIOR		16 credits	SENIOR		15 credits
CAAM 415	Theoretical Neuroscience I	3	CAAM 416	Theoretical Neuroscience II	3
ELEC 241	Fundamentals of Electrical Engineering I	3	ELECT	Required Elective Course	3
ELEC 240	Fundamentals of Electrical Engineering Lab	1	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

SAMPLE DEGREE PLAN

Neuroscience BS - Major Concentration in Cellular and Molecular Neuroscience

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN			FRESHMAN		
		13 credits			14 credits
BIOS 201	Intro Biology I	3	MATH 102	Single Variable Calculus II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 123	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	LPAP	Lifetime Physical Activity Elective	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
SOPHOMORE			SOPHOMORE		
		15 credits			15 credits
CHEM 211	Organic Chemistry I	3	STAT 305	Intro to Stat for Biosciences	4
CHEM 213	Organic Chemistry Discussion I	0	NEUR 380	Fund. Neuroscience Systems	3
PSYC 203	Intro to Cognitive Psychology	3	BIOS 212	Intermediate Exptl. Neuro.	2
CMOR 210	Intro to Engineering Computation	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR			JUNIOR		
		16 credits			15 credits
NEUR 310	Ind. Research in Neuroscience	3	ELECT	Required Elective Course	3
LAB	Required Lab	1	NEUR 362	Cognitive Neuroscience	3
BIOS 385	Fund. Cellular/Molecular Neuro.	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
SENIOR			SENIOR		
		16 credits			16 credits
NEUR 383	Intro to Neuroengineering	3	BIOS 344	Molecular Biology and Genetics	3
BIOS 341	Cell Biology	3	ELECT	Required Elective Course	3
PHYS 125	General Physics (with lab)	4	PHYS 126	General Physics II (with lab)	4
CAPSTONE	Neuroscience Capstone	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Neuroscience Minor - Requirements

NEUR 380/PSYC 380

Fundamental Neuroscience Systems

Each student must also complete the requirements for one area of specialization

Area of Specialization: Humanities and Social Science

NEUR 362/PSYC 362

Cognitive Neuroscience: Exploring the Living Brain

Select a minimum of 3 courses (9 credit hours) from the Humanities and Social Science area of specialization list in the 2023 GA

Select at least 1 course (3 credit hours) from the Natural Science and Engineering area of specialization list in the 2023 GA. BIOS 385 may be used to fulfill this requirement.

Area of Specialization: Natural Sciences and Engineering

BIOS 385

Cellular and Molecular Mechanisms of the Neuron

Select a minimum of 3 courses (9 credit hours) from the Natural Science and Engineering area of specialization list in the 2023 GA

Select at least 1 course (3 credit hours) from the Humanities and Social Science area of specialization list in the 2023 GA. NEUR 362/PSYC 362 may be used to fill this requirement.

At least 2 of the electives should be completed for the minor only (not shared or double-counted with another major)

PHYSICS AND ASTRONOMY

Students in the Department of Physics and Astronomy will acquire and demonstrate a solid foundation of knowledge in physics and/or astronomy and deeper knowledge of subdivisions of the field related to their interests. They will build the theoretical and laboratory skills necessary to succeed in graduate school or in the workplace and become leaders in their chosen discipline.

Students will develop the ability to identify, formulate and solve challenging scientific and technical problems as encountered in physics and astronomy. They will acquire basic skills in reading the scientific literature and learn how to communicate scientific results orally and in writing with scientists and the general public.

The BA degrees in physics and astronomy provide a broad liberal education with a concentration in physical science, while allowing time to pursue other interests. Graduates typically seek employment in a range of professional fields or in secondary teaching.

The BS degrees in physics and astrophysics are intended to provide intensive pre-professional training. Options for specialized study include applied physics, biological physics and computational physics. Most graduates continue in graduate study or find immediate employment in a technical field.

Degrees Offered

Physics	BA, BS, minor
Astronomy	BA, minor
Astrophysics	BS

PHYSICS AND ASTRONOMY

Frank Advice

- Talk to the PHYS 111 instructor about AP physics credit. It is usually better to take PHYS 111/112 rather than jumping straight into PHYS 201. If you are unsure what to do, speak with the PHYS 111 instructor.
- The BA degree, particularly, can be solid preparation for medical school, law school or teaching, but you will need additional course work specific to those areas.
- A senior research project and thesis are required for the BS degrees. Prior to that, there are summer research experiences available with faculty in the department and at many other universities and national labs. Announcements are distributed to majors via email regularly.
- While computational classes are explicitly required only for the astronomy, astrophysics and computational physics degrees, all areas of physics and astronomy make use of computer programming and numerical analysis. Students should have some exposure to these areas so they can write programs to analyze data and present results as needed for their research projects and classes.
- For the astronomy and astrophysics degrees, ASTR 350 is nearly always taken in the fall of the junior year. The spring courses, ASTR 230 and ASTR 360, can be taken as a sophomore the semester before ASTR 350 or as a junior the semester after ASTR 350. Both semesters of the seminar ASTR 400 should be taken as a senior unless the student plans to be off-campus during one of those semesters.

Physics BA - Requirements

MATH 101 or MATH 105	Single Variable Calculus I or AP/OTH credit in Calculus I
MATH 102 or MATH 106	Single Variable Calculus II or AP/OTH credit in Calculus II
MATH 211 or MATH 220 or MATH 221	Ordinary Differential Equations and Linear Algebra or Honors Ordinary Differential Equations or Honors Calculus III
MATH 212 or MATH 222 or MATH 232	Multivariable Calculus or Honors Calculus IV or Honors Multivariable Calculus

Select 1 from:

PHYS 101 and PHYS 103 PHYS 111	Mechanics (with Lab) and Mechanics Discussion Honors Mechanics (with Lab)
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Select 1 from:

PHYS 102 and PHYS 104 PHYS 112	Electricity and Magnetism (with Lab) and Electricity and Magnetism Discussion Honors Electricity and Magnetism (with Lab)
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PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 311	Introduction to Quantum Physics I

Select 2 courses from:

PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
PHYS 312	Introduction to Quantum Physics II
PHYS 355	Introduction to Biological Physics
PHYS 411	Introduction to Nuclear and Particle Physics
PHYS 416	Computational Physics
PHYS 425	Statistical and Thermal Physics
PHYS 480	Introduction to Plasma Physics

Select 6 additional credit hours of PHYS or ASTR courses at the 300-level or above

Select 1 course from:

CMOR 220	Introduction to Engineering Computation
1 course from CMOR course offerings at the 300-level or above	
1 course from MATH course offerings at the 300-level or above	

Physics BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN			FRESHMAN		
		14 credits			16 credits
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SOPHOMORE			SOPHOMORE		
		15 credits			16 credits
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
DIST	Distribution Course	3	MATH 211	Differential Equations	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
JUNIOR			JUNIOR		
		13 credits			16 credits
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
PHYS 311	Intro to Quantum Physics I	3	CMOR 220	Intro to Engineering Computation	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SENIOR			SENIOR		
		15 credits			15 credits
PHYS/ASTR	Advanced PHYS/ASTR lecture	3	PHYS/ASTR	Advanced PHYS/ASTR lecture	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Physics BS - Requirements

MATH 101 or MATH 105	Single Variable Calculus I or AP/OTH credit in Calculus I
MATH 102 or MATH 106	Single Variable Calculus II or AP/OTH credit in Calculus II
MATH 211 or MATH 220	Ordinary Differential Equations and Linear Algebra or Honors or MATH 221
	Ordinary Differential Equations or Honors Calculus III
MATH 212 or MATH 222	Multivariable Calculus or Honors Calculus IV
or MATH 232	or Honors Multivariable Calculus

Select 1 from:

PHYS 101 and PHYS 103	Mechanics (with Lab) and Mechanics Discussion
PHYS 111	Honors Mechanics (with Lab)

Select 1 from:

PHYS 102 and PHYS 104	Electricity and Magnetism (with Lab) and Electricity and Magnetism Discussion
PHYS 112	Honors Electricity and Magnetism (with Lab)

PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 301	Intermediate Mechanics
PHYS 311	Introduction to Quantum Physics I
PHYS 491 and PHYS 493	Undergraduate Research and Undergraduate Research Seminar
PHYS 492 and PHYS 494	Undergraduate Research and Undergraduate Research Seminar

Each student must complete the additional courses for one major concentration.

Major Concentration in Applied Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312 or ELEC 361	Intro to Quantum Physics II or Quantum Mechanics for Engineers
PHYS 332	Junior Physics Lab II
ELEC 364	Photonics Measurements: Principles and Practice
PHYS 412	Solid State Physics (or approved substitute in applied physics)
PHYS 425	Statistical and Thermal Physics
ELEC 242 and ELEC 244	Signals, Systems, and Transforms and Analog Circuits Lab
or ELEC 243	or Electronic Measurement Systems
ELEC 305	Introduction to Physical Electronics II
MATH 381	Introduction to Partial Differential Equations
or CMOR 304	or Differential Equations in Science and Engineering

Major Concentration in Biological Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312	Introduction to Quantum Physics II
PHYS 355	Introduction to Biological Physics
PHYS 425	Statistical and Thermal Physics
BIOS 201	Introductory Biology I

(continued)

Physics BS - Requirements

Major Concentration in Biological Physics *continued*

BIOS 211	Intermediate Experimental Cellular and Molecular Biosciences
BIOS 301 <i>or</i> BIOS 341	Biochemistry I <i>or</i> Cell Biology
CHEM 121 123, 122 & 124*	General Chemistry I & II <i>and</i> General Chemistry Lab I & II
CHEM 211 <i>and</i> CHEM 213	Organic Chemistry I <i>and</i> Organic Chemistry Discussion I
MATH 381 <i>or</i> CMOR 304	Introduction to Partial Differential Equations <i>or</i> Differential Equations in Science and Engineering

*CHEM 111 & 113, 112 & 114 may substitute for CHEM 121 & 123, 122 & 124

Major Concentration in Computational Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312 <i>or</i> PHYS 425	Intro. to Quantum Physics II <i>or</i> Statistical and Thermal Physics
PHYS 416	Computational Physics
CMOR 220	Introduction to Engineering Computation
CMOR 303 <i>or</i> CMOR 302 <i>or</i> MATH 355	Matrix Analysis for Data Science <i>or</i> Matrix Analysis <i>or</i> Linear Algebra
CMOR 304 <i>or</i> MATH 381	Differential Equations in Science and Engineering <i>or</i> Introduction to Partial Differential Equations
CMOR 422	Numerical Analysis
COMP 130 <i>or</i> COMP 140	Elements of Algorithms and Computation <i>or</i> Computational Thinking

Select 2 courses from:

CMOR 420	Computational Science
CMOR 421	High Performance Computing
CMOR 423	Numerical Methods for Partial Differential Equations
CMOR 435/MATH 435	Dynamical Systems
MECH 454	Computational Fluid Mechanics
PHYS 449	Projects in Data-Enabled Physics
PHYS 580	Introduction to Plasma Physics

Major Concentration in General Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312	Introduction to Quantum Physics II
PHYS 332	Junior Physics Lab II
PHYS 425	Statistical and Thermal Physics

Select 2 courses from:

PHYS 355	Introduction to Biological Physics
PHYS 411	Introduction to Nuclear and Particle Physics
PHYS 412	Solid State Physics
PHYS 416	Computational Physics
PHYS 480	Introduction to Plasma Physics

MATH 381 <i>or</i> CMOR 304	Introduction to Partial Differential Equations <i>or</i> Differential Equations in Science and Engineering
MATH 382 <i>or</i> CMOR 302 <i>or</i> CMOR 303	Computational Complex Analysis <i>or</i> Matrix Analysis <i>or</i> Matrix Analysis for Data Science

Physics BS - General Physics Concentration

SAMPLE DEGREE PLAN

This is **only one** of many possible ways to fulfill your degree requirements.

FALL			SPRING		
FRESHMAN		14 credits	FRESHMAN		16 credits
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SOPHOMORE		15 credits	SOPHOMORE		16 credits
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
DIST	Distribution Course	3	MATH 211	Differential Equations	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
JUNIOR		16 credits	JUNIOR		15 credits
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
PHYS 311	Intro to Quantum Physics I	3	PHYS 312	Intro to Quantum Physics II	3
CMOR 304	Differential Equations in Science and Engineering	3	PHYS 332	Junior Physics Lab II	2
OPEN	Open Elective	3	CMOR 302	Matrix Analysis	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		15 credits
PHYS 425	Statistical and Thermal Physics	3	PHYS 412	Solid State Physics	3
PHYS 411	Introduction to Nuclear and Particle Physics	3	PHYS 492	Undergraduate Research	2
PHYS 491	Undergraduate Research	2	PHYS 494	Undergraduate Research Seminar	1
PHYS 493	Undergraduate Research Seminar	1	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Physics Minor - Requirements*Select 1 from:*PHYS 101 *and* PHYS 103
PHYS 111Mechanics (with Lab) *and* Mechanics Discussion
Honors Mechanics (with Lab)*Select 1 from:*PHYS 102 *and* PHYS 104

PHYS 112Electricity and Magnetism (with Lab) *and*
Electricity and Magnetism Discussion
Honors Electricity and Magnetism (with Lab)MATH 101 *or* MATH 105
MATH 102 *or* MATH 106
MATH 211 *or* MATH 221Single Variable Calculus I *or* AP/OTH credit in Calculus I
Single Variable Calculus II *or* AP/OTH credit in Calculus II
Ordinary Differential Equations and Linear Algebra *or*
Honors Calculus IIIMATH 212 *or* MATH 222
or MATH 232Multivariable Calculus *or* Honors Calculus IV
or Honors Multivariable CalculusPHYS 201
PHYS 202Waves, Light, and Heat
Modern Physics

Select 3 additional credit hours from PHYS course offerings at the 300-level or above

Astronomy BA - Requirements

COMP 130 <i>or</i> COMP 140	Elements of Algorithms and Computation <i>or</i> Computational Thinking
MATH 101 <i>or</i> MATH 105	Single Variable Calculus I <i>or</i> AP/OTH credit in Calculus I
MATH 102 <i>or</i> MATH 106	Single Variable Calculus II <i>or</i> AP/OTH credit in Calculus II
MATH 211	Ordinary Differential Equations and Linear Algebra
<i>or</i> MATH 220	<i>or</i> Honors Ordinary Differential Equations
<i>or</i> MATH 221	<i>or</i> Honors Calculus III
MATH 212	Multivariable Calculus
<i>or</i> MATH 222	<i>or</i> Honors Calculus IV
<i>or</i> MATH 232	<i>or</i> Honors Multivariable Calculus
<i>Select 1 from:</i>	
PHYS 101 <i>and</i> PHYS 103	Mechanics (with Lab) <i>and</i> Mechanics Discussion
PHYS 111	Honors Mechanics (with lab)
<i>Select 1 from:</i>	
PHYS 102 <i>and</i> PHYS 104	Electricity and Magnetism (with Lab) <i>and</i> Electricity and Magnetism Discussion
PHYS 112	Honors Electricity and Magnetism (with Lab)
PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
ASTR 230	Astronomy Lab
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxies and Cosmology
ASTR 400	Undergraduate Research Seminar (two semesters required)
<i>Select 1 from:</i>	
ASTR 408	Statistical Methods in Physics and Astronomy
ASTR 451	Astrophysics I: Sun and Stars
ASTR 452	Astrophysics II: Galaxies and Cosmology
ASTR 470	Solar System Physics
PHYS 480	Introduction to Plasma Physics

PHYSICS AND ASTRONOMY

Astronomy BA

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL			SPRING		
FRESHMAN			FRESHMAN		
		14 credits			13 credits
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3			
SOPHOMORE			SOPHOMORE		
		16 credits			16 credits
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
COMP 140	Computational Thinking	3	MATH 211	Differential Equations	3
DIST	Distribution Course	3	ASTR 230	Astronomy Lab	3
OPEN	Open Elective	4	OPEN	Open Elective	3
			OPEN	Open Elective	3
JUNIOR			JUNIOR		
		16 credits			16 credits
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
ASTR 350	Intro to Astrophysics - Stars	3	ASTR 360	Intro to Astrophysics - Galaxies and Cosmology	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR			SENIOR		
		16 credits			13 credits
ASTR 451	Astrophysics I - Sun and Stars	3	ASTR 400	Undergraduate Research Seminar	1
ASTR 400	Undergraduate Research Seminar	1	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

Astrophysics BS - Requirements

COMP 130 or COMP 140	Elements of Algorithms and Computation or Computational Thinking
MATH 101 or MATH 105	Single Variable Calculus I or AP/OTH credit in Calculus I
MATH 102 or MATH 106	Single Variable Calculus II or AP/OTH credit in Calculus II
MATH 211 or MATH 220 or MATH 221	Ordinary Differential Equations and Linear Algebra or Honors Ordinary Differential Equations or Honors Calculus III
MATH 212 or MATH 222 or MATH 232	Multivariable Calculus or Honors Calculus IV or Honors Multivariable Calculus
<i>Select 1 from:</i>	
PHYS 101 and PHYS 103 PHYS 111	Mechanics (with Lab) and Mechanics Discussion Honors Mechanics (with Lab)
<i>Select 1 from:</i>	
PHYS 102 and PHYS 104 PHYS 112	Electricity and Magnetism (with Lab) and Electricity and Magnetism Discussion Honors Electricity and Magnetism (with Lab)
PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
PHYS 311	Introduction to Quantum Physics I
PHYS 425	Statistical and Thermal Physics
PHYS 491 and PHYS 493	Undergraduate Research and UG Research Seminar
PHYS 492 and PHYS 494	Undergraduate Research and UG Research Seminar
ASTR 230	Astronomy Lab
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxies and Cosmology
ASTR 400	Undergraduate Research Seminar (two semesters required)
<i>Select 3 from:</i>	
ASTR 408	Statistical Methods in Physics and Astronomy
ASTR 451	Astrophysics I: Sun and Stars
ASTR 452	Astrophysics II: Galaxies and Cosmology
ASTR 470	Solar System Physics
PHYS 312	Introduction to Quantum Physics II
PHYS 480	Introduction to Plasma Physics

Astrophysics BS

SAMPLE DEGREE PLAN

*This is **only one** of many possible ways to fulfill your degree requirements.*

FALL

SPRING

FRESHMAN			FRESHMAN		
14 credits			13 credits		
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3			

SOPHOMORE			SOPHOMORE		
16 credits			16 credits		
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
COMP 140	Computational Thinking	4	MATH 211	Differential Equations	3
DIST	Distribution Course	3	ASTR 230	Astronomy Lab	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3

JUNIOR			JUNIOR		
16 credits			16 credits		
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
PHYS 311	Intro to Quantum Physics I	3	ASTR 360	Intro to Astrophysics - Galaxies and Cosmology	3
ASTR 350	Intro to Astrophysics - Stars	3	PHYS 312	Intro to Quantum Physics II	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3

SENIOR			SENIOR		
15 credits			16 credits		
PHYS 425	Statistical and Thermal Physics	3	PHYS 492	Undergraduate Research	2
PHYS 491	Undergraduate Research	2	PHYS 494	Undergraduate Research Seminar	1
PHYS 493	Undergraduate Research Seminar	1	ASTR 452	Astrophysics II - Galaxies and Cosmology	3
ASTR 451	Astrophysics I - Sun and Stars	3	ASTR 400	Undergraduate Research Seminar	1
ASTR 400	Undergraduate Research Seminar	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3

MAJOR ADVISORS

BIOSCIENCES

Prospectives, Freshmen and Undeclared Sophomores

Pre-declaration advisors are arranged geographically so that you can start by contacting an advisor assigned to your college or a college nearby.

(North)	Brown	Beth Beason-Abmayr	bbeason@rice.edu
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		Jamie Catanese	djc98@rice.edu
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		Caná Ross	cana.ross@rice.edu
		Yang Gao	yg60@rice.edu
(Baker)	Baker	Cassidy Johnson*	cbj5145@rice.edu
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		Dan Carson	daniel.d.carson@rice.edu
		Dan Wagner	dswagner@rice.edu

*Ecology and Evolutionary Biology specialist advisor

Declared Majors and Minors

Major concentrations: Biochemistry, Cell Biology and Genetics, Integrative Biology

Minor: Biochemistry and Cell Biology

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Major concentrations: Ecology and Evolutionary Biology, Integrative Biology

Minor: Ecology and Evolutionary Biology

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Transfer Credit

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Jamie Catanese	djc98@rice.edu
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Major concentrations: Ecology and Evolutionary Biology, Integrative Biology

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Geoscience and Environmental Earth Science Areas of Specialization and Minors

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Geoscience and Planetary Science Areas of Specialization and Minors

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Applied Physics

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Biological Physics

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Computational Physics

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Stan Dodds dodds@rice.edu (Physics)

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Overload Petitions

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