

# NATURAL SCIENCES

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## New Student Advising FALL 2022

Welcome to the Rice University Class of 2026!

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 advice and reference information, descriptions of each of our departments and programs, and degree summaries and sample degree plans for each science degree.

This booklet is intended as a supplement to, not a replacement for, other department advising materials. While we have double- and triple-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



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## ADVISORS

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As an incoming first-year student at Rice, you have many advisors available to you. Your College Magister has chosen eight Divisional Advisors who are associated with your residential college, two from each of the four major undergraduate divisions: engineering, humanities, natural sciences and social sciences. Each residential college also has a group of Peer Academic Advisors available to assist the Divisional Advisors. These advisors can help you explore the majors in each of the four divisions based on your personal interests and short- and long-term plans.

When you declare your major, your department will assign you to a Major Advisor. These faculty members represent a specific department or discipline and know all of the requirements for the major or minor. They can provide you with detailed information related to their discipline, including research opportunities, career paths, professional organizations and graduate school. You do not need to wait until you declare a major to consult with a Major Advisor. If you are interested in pursuing a major and need specific guidance or advice, contact a Major Advisor. You can find the names and contact information for the Major Advisors in the School of Natural Sciences at the back of this booklet.

Start talking to your advisors as early as possible. There are many paths to each degree and the best courses for you may depend on your preparation and career aspirations. Your advisors can provide you with input on taking classes in a sensible order and also on how to pursue research opportunities.

## DIVISIONAL ADVISORS

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## AP CREDIT

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Many first-year Rice students have substantial AP credit, particularly in math, physics and chemistry. Think carefully about your course plan— just because you have advanced placement does not mean that you have the background needed for the next courses. You do not want to get underwater during your first year. Many students with AP credit for introductory courses still choose to take the introductory sequence at Rice to provide a solid foundation for more advanced coursework. Consult with your advisors to determine the appropriate placement for you.

## DEGREE PLANNING

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Get your prerequisites in early. Identify all prerequisites for future courses so that you are positioned to take the required courses at the right stage in your time at Rice.

Some courses may only be offered once per year or once every other year. Take this into account when planning your schedule.

Remember to look at the courses taught in other departments that overlap with your interests. For example, there are mathematics courses taught in CAAM and STAT that are not offered in MATH.

## CHOOSING A BA OR BS DEGREE

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Most of our departments offer both a Bachelor of Arts degree (BA) and a Bachelor of Science degree (BS). If you have the choice between a BS or a BA, consider the requirements of each degree, your planned major(s) and/or minor(s), and your graduate school or career plans.

In general, a BA program contains more free elective hours than its BS counterpart. This flexibility makes it easier for you to pursue your other interests, a double major or a minor. The major requirements and a sample degree plan for both the BA and BS are included in this booklet. Look through these to understand the different requirements and how they work with your planned course schedule.

If you are planning to go to graduate school or pursue a career in a scientific discipline, you should consider the BS degree. If you are preparing for a career that is not primarily in that scientific discipline and want to pursue other areas of interest, the BA degree might be right for you.

And, as always, you can talk with your peer and faculty advisors to help you decide which is the right path for you.



# RESEARCH

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Participation in scientific research is encouraged for all students and is required for several of the BS degrees. Mentored research opportunities complement classroom learning and help you build the skills and confidence you need to compete for top job prospects and spots in graduate and medical schools.

There are many opportunities to conduct research with Rice faculty and with our partners at the Texas Medical Center (TMC). You are encouraged to begin research as early as possible and you can participate for multiple semesters or summers. See the Frank Advice section in each department listing for additional program-specific advice.

## **Getting Started**

- Talk to your advisors and to your professors. Did you cover something really interesting in class today? Stay after class for a few minutes or head to office hours to talk to your professor. They can point you towards faculty members who are doing research in that area or working on similar problems.
- Check departmental websites and faculty research pages for descriptions of their research as well as links to their publications.
- Go to departmental seminars and events. Talk to people while you are there; don't just sit in the back. Attend the Rice Undergraduate Research Symposium (held each spring) to see student research poster presentations. Also, look at the posters in the hallways on your way to or from class or lab.

# RESEARCH

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## **Contacting a Potential Advisor**

- Once you've found a group that you might like to join, it's time to contact your potential advisor. The easiest way to do this is to email the faculty member to set up a meeting. Use an informative subject line to make your purpose clear, and open and close your email formally. Provide some of your background information, including what year you are and what your major is. Briefly describe how you found out about their research and express your interest in a specific paper or research topic. Ask them to set up a meeting and provide your availability.
- Show up to your meeting on time and be prepared. Review a few papers and brush up on any appropriate classroom content. Be ready to tell the professor why you are interested in their work and how it fits with your background and your future goals. Also, know your schedule and what time you have available to work in their lab.
- Don't take a negative response personally. There are many reasons a faculty member might not be able to take you on right now. Keep looking; there is a research experience out there that is perfect for you.

## PRE-HEALTH PROFESSIONS

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Majoring in a scientific discipline does not increase your chance of acceptance to medical school. However, strong preparation in the sciences and mathematics is required for medical school study. If you are considering a career in a health-related occupation, consult with your advising team to ensure that your degree plan includes all of the necessary courses.

The Office of Academic Advising (OAA) offers specialized advising services for pre-med and other pre-health professions students. Each fall, they present an introduction to the health professions designed to help new, first-year students.

## STUDY ABROAD

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International experiences are encouraged for all interested students. If you are considering studying abroad, early planning and consultation is highly recommended. Contact a department Major Advisor as early as possible to discuss all of your available options. Departmental Transfer Credit Advisors will also serve as a valuable resource for information about receiving academic credit for courses completed abroad.

Think about your goals. Do you want to study abroad for a semester or a summer? Do you want to fulfill major, minor or distribution requirements or study something entirely new?

Consider your individual four-year program and evaluate what period for study abroad is most compatible with your overall degree plan and post-graduate plans.

Visit the Rice University Study Abroad website ([abroad.rice.edu](http://abroad.rice.edu)) for all of the information you need to start planning your study abroad experience.

## DEPARTMENTS AND PROGRAMS

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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 18 majors and seven 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.

# BIOSCIENCES

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Biosciences is a vibrant community of scholars engaged in research and teaching in a wide range of disciplines within the life sciences. Biosciences majors have diverse biological interests and the major is structured to allow a focused exploration within their areas of interest. The Biosciences major is divided into four distinct major concentrations: Biochemistry, Cell Biology and Genetics, Ecology and Evolutionary Biology, and Integrative Biology.

All major concentrations offer a BA and a BS option. Both degree options offer the same depth of content, allow for participation in undergraduate research and prepare students for a diversity of career paths. While research participation is encouraged for both degrees, it is required for the BS degree, making it 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 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

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## Degrees Offered

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

## Frank Advice

- Those without biology AP 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 310/401).
- Research participation is encouraged for all students and required for the BS degrees.
  - Visit the website [biosugresearch.rice.edu](http://biosugresearch.rice.edu) for more information on the Biosciences departmental research program and tips for finding a research lab.
  - Join the Biosciences Opportunities Canvas site and mailing list; go to [catalog.rice.edu](http://catalog.rice.edu) to enroll. This is our main venue for up to date information about research opportunities at Rice, the TMC 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 & CHEM 124	General Chemistry II and General Chemistry Laboratory II
CHEM 211 & 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 (in BIOE, BIOS, or EEPS) list for the Major Concentration in Biochemistry in the 2022 GA

BIOS 211	Intermediate Experimental Biosciences
BIOS 311	Advanced Experimental Biosciences

Select 2 courses from the Elective Laboratory Courses list for the Major Concentration in Biochemistry in the 2022 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Biochemistry in the 2022 GA



## Biosciences BA

### Major Concentration in Cell Biology and Genetics

CHEM 122 & CHEM 124 General Chemistry II and General Chemistry Laboratory II  
CHEM 211 & 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 in Cell Biology and Genetics list for the Major Concentration in Cell Biology and Genetics in the 2022 GA

BIOS 211 Intermediate Experimental Biosciences

Select 3 courses from the Elective Laboratory Courses list for the Major Concentration in Cell Biology and Genetics in the 2022 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Cell Biology and Genetics in the 2022 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 2022 GA

Select 2 courses from the Elective Lecture Courses in Biochemistry and Cell Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2022 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 2022 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Ecology and Evolutionary Biology in the 2022 GA

## Biosciences BA

### Major Concentration in Integrative Biology

CHEM 122 & CHEM 124    General Chemistry II and General Chemistry Laboratory II  
CHEM 211 & 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 2022 GA

Select 1 course from the Elective Lecture Course in Biochemistry and Cell Biology list for the Major Concentration in Integrative Biology in the 2022 GA

BIOS 211                    Intermediate Experimental 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 2022 GA

Select 1 course from the Capstone Requirement list for the Major Concentration in Integrative Biology in the 2022 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 may be substituted for STAT 305

**SAMPLE DEGREE PLAN**

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

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

FALL			SPRING		
<b>FRESHMAN</b>		<b>16 credits</b>	<b>FRESHMAN</b>		<b>14 credits</b>
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	3	DIST	Distribution Course	3
<b>SOPHOMORE</b>		<b>15 credits</b>	<b>SOPHOMORE</b>		<b>16 credits</b>
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 301	Biochemistry I	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			
<b>JUNIOR</b>		<b>15 credits</b>	<b>JUNIOR</b>		<b>16 credits</b>
BIOS 341	Cell Biology	3	BIOS 344	Molecular Biology and Genetics	3
BIOS Lab 300+	Elective Lab	3	BIOS 300+	Elective Lecture	3
DIST	Distribution Course	3	BIOS Lab 300+	Elective Lab (or Reseach)	1
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
<b>SENIOR</b>		<b>13 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
BIOS Lab 300+	Elective Lab	1	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

## Biosciences BS - Requirements

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)
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 & CHEM 124	General Chemistry II and General Chemistry Laboratory II
CHEM 211 & 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 (in BIOE, BIOS, or EEPS) list for the Major Concentration in Biochemistry in the 2022 GA

BIOS 211	Intermediate Experimental Biosciences
BIOS 311	Advanced Experimental Biosciences

Select 1 course from the Elective Laboratory Course list for the Major Concentration in Biochemistry in the 2022 GA

*Select 1 from:*

BIOS 310	Independent Research for Biosciences Undergraduates (at least 3 credit hours per semester for a minimum of 3 semesters)
BIOS 401 & BIOS 402	Undergraduate Honors Research

Select 1 course from the Capstone Requirement list for the Major Concentration in Biochemistry in the 2022 GA



## Biosciences BS

### Major Concentration in Ecology and Evolutionary Biology *continued*

Select 1 from:

BIOS 310	Independent Research for Biosciences Undergraduates (at least 3 credit hours per semester for a minimum of 3 semesters)
BIOS 401 & BIOS 402	Undergraduate Honors Research

Select 1 course from the Capstone Requirement list for the Major Concentration in Ecology and Evolutionary Biology in the 2022 GA

### Major Concentration in Integrative Biology

CHEM 122 & CHEM 124	General Chemistry II and General Chemistry Laboratory II
CHEM 211 & 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 2022 GA

Select 1 course from the Elective Lecture Course in Biochemistry and Cell Biology list for the Major Concentration in Integrative Biology in the 2022 GA

BIOS 211	Intermediate Experimental 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 2022 GA

Select 1 from:

BIOS 310	Independent Research for Biosciences Undergraduates (at least 3 credit hours per semester for a minimum of 3 semesters)
BIOS 401 & BIOS 402	Undergraduate Honors Research

Select 1 course from the Capstone Requirement list for the Major Concentration in Integrative Biology in the 2022 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 may be substituted for STAT 305

## Biosciences BS - Major Concentration in Integrative Biology

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

FALL			SPRING		
<b>FRESHMAN</b>		<b>16 credits</b>	<b>FRESHMAN</b>		<b>14 credits</b>
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 I Lab	1	CHEM 124	General Chemistry II Lab	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
<b>SOPHOMORE</b>		<b>15 credits</b>	<b>SOPHOMORE</b>		<b>15 credits</b>
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 213	Intro Lab in Ecology & Evolutionary Biology	2
CHEM 211	Organic Chemistry I	3	BIOS 334	Evolution	3
CHEM 213	Organic Chemistry I Discussion	0	STAT 305	Intro to Statistics for Biosciences	4
PHYS 125	General Physics (with lab)	4	BIOS 310	Independent Research	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3			
<b>JUNIOR</b>		<b>15 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
BIOS 301	Biochemistry I	3	NSCI/ENG	200+ level Elective	3
BIOS 332	Ecology	3	BIOS 341	Cell Biology	3
BIOS 310	Independent Research	3	BIOS 310	Independent Research	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
<b>SENIOR</b>		<b>16 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
BIOS Lab 300+	Elective Lab	1	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
OPEN	Open Elective	3			

## 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 & 213	Organic Chemistry I and Organic Chemistry Discussion I
CHEM 212* & 214	Organic Chemistry II and Organic Chemistry Discussion II
CHEM 215 <i>or</i> CHEM 365	Organic Chemistry Lab
BIOS 201	Introductory Biology I
BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 211	Intermediate Experimental Biosciences

Select 1 course from the Lecture Course Requirement list in the 2022 GA

\* MATH 111 **and** 112 may substitute for MATH 101

CHEM 320 may substitute for CHEM 212

PHYS 101 **and** 103 **or** PHYS 111 may substitute for PHYS 125

PHYS 102 **and** 104 **or** PHYS 112 may substitute for PHYS 126



## 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

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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 a strong aptitude 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 this interdisciplinary major.

## Degrees Offered

Chemical Physics      BS

## Frank Advice

- Chemical Physics is an interdisciplinary field drawing on 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, speak with 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 year, but don't feel pressured to start your first year.

## CHEMICAL PHYSICS

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### Chemical Physics BS - Requirements

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

*Select 1 from:*

CHEM 122 & CHEM 124      General Chemistry II and General Chemistry Laboratory II

CHEM 201 & 205      Advanced Topics in General Chemistry and Lab

CHEM 211 & CHEM 213  
or CHEM 319      Organic Chemistry I and Organic Chemistry Discussion  
or Organic Chemistry I

CHEM 215 or CHEM 365      Organic Chemistry Lab  
CHEM 301      Physical Chemistry I  
CHEM 302      Physical Chemistry II

*Select 1 from:*

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

*Select 1 from:*

PHYS 102 & 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 302      Intermediate Electrodynamics  
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      Ordinary Differential Equations and Linear Algebra  
or MATH 220      or Honors Ordinary Differential Equations  
or MATH 221      or Honors Calculus III  
MATH 212 or MATH 222      Multivariable Calculus or Honors Calculus IV

*Select 3 courses from:*

PHYS 311      Introduction to Quantum Physics I  
PHYS 312 or CHEM 430      Intro to Quantum Physics II or Quantum Chemistry  
CHEM 360      Inorganic Chemistry  
CHEM 415      Chemical Kinetics and Dynamics  
CHEM 420 or PHYS 425      Classical and Statistical Thermodynamics  
or Statistical and Thermal Physics

*Select 2 courses from:*

CHEM 366      Inorganic Chemistry Lab  
CHEM 367      Materials Chemistry Lab  
CHEM 368      Chemical Measurement Lab  
CHEM 491 or PHYS 461      Research for Undergraduates (up to 2 hours)  
or Independent Research  
PHYS 332      Junior Physics Lab II

Select 2 courses from MATH or CAAM course offerings at the 300-level or above

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

## 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			14 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	DIST	Distribution Course	3

  

SOPHOMORE			SOPHOMORE		
15 credits			16 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
			LPAP	Lifetime Physical Activity Elective	1

  

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/ CAAM	300+ level Elective	3
OPEN	Open Elective	3	DIST	Distribution Course	3

  

SENIOR			SENIOR		
17 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/ CAAM	300+ level 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			

# CHEMISTRY

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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

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## 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 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.
- The best way 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 TMC.

## Chemistry BA - Requirements

CHEM 121 & 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 & CHEM 213      Organic Chemistry I and Organic Chemistry  
 Discussion I  
 CHEM 319                      Organic Chemistry I

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 & 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 & 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                      Advanced Experimental Biosciences  
 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 or CHEM 212      Organic Chemistry II  
 Any lecture course between CHEM 400 and CHEM 489  
 Any lecture course between CHEM 495 and CHEM 699

\* CHEM 111 & 113, 112 & 114 may substitute for CHEM 121 & 123, 122 & 124  
 MATH 221 & 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		14 credits	FRESHMAN		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
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
PHYS 101	Mechanics (with Lab)	4	LPAP	Lifetime Physical Activity Elective	1
PHYS 103	Mechanics Discussion	0	PHYS 102	Electricity & Magnetism (with Lab)	4
			PHYS 104	Electricity & Magnetism Discussion	0
SOPHOMORE		15 credits	SOPHOMORE		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		17 credits	JUNIOR		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
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		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 & 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 & CHEM 213      Organic Chemistry I and Discussion  
 CHEM 319                      Organic Chemistry I

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 & 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 & 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 courses from:*

BIOS 311                      Advanced Experimental Biosciences  
 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 & 113, 112 & 114 may substitute for CHEM 121 & 123, 122 & 124

MATH 221 & 222 may substitute for MATH 212

## Chemistry BS - Requirements

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

### Area of Specialization: Biological and Medicinal Chemistry

Select 1 from:

CHEM 212 & CHEM 214	Organic Chemistry II and Discussion
CHEM 320	Organic Chemistry II

BIOS 302	Biochemistry II
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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

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

Select 1 from:

CHEM 212 & CHEM 214	Organic Chemistry II and Discussion
CHEM 320	Organic Chemistry II

CHEM 401	Advanced Organic Chemistry
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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	DIST	Distribution Course	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
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

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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 Science and Planetary Science. Compared to the BS major, the BA provides greater flexibility of course choices.

### Degrees Offered

Earth, Environmental and Planetary Sciences      BA, BS, Minor

### Frank Advice

- If you have math AP credit, consider taking more advanced MATH classes during your freshman 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 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 <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
CHEM 121 & 123, 122 & 124*	General Chemistry I and II with labs

Select 1 course from:

EEPS 101	The Earth
EEPS 107	The Science of Climate Change
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 & BIOS 202	Introductory Biology I <i>and</i> Introductory Biology II
PHYS 101 & 103 & 102 & 104	Mechanics (with Lab) and Mechanics Discussion and Electricity & Magnetism (with Lab) and Electricity & Magnetism Discussion
PHYS 125 & PHYS 126	General Physics and General Physics II (with Labs)

### Group B

Select 2 from the following Option Categories:

#### Option Category 1

Select 1 from:

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

#### Option Category 2

BIOS 211 & 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> CAAM 210	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 & 113, 112 & 114 may substitute for CHEM 121 & 123, 122 & 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		
<b>FRESHMAN</b>		<b>15 credits</b>	<b>FRESHMAN</b>		<b>17 credits</b>
ESCI 115	Introduction to the Earth	4	EEPS 323	Earth Structure & Deformation	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	OPEN	Open Elective	3
<b>SOPHOMORE</b>		<b>13 credits</b>	<b>SOPHOMORE</b>		<b>16 credits</b>
EEPS 321	Earth System Evolution & Cycles	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
<b>JUNIOR</b>		<b>16 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
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
<b>SENIOR</b>		<b>15 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
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 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	Ordinary Differential Equations and Linear Algebra
CHEM 121 & 123 or CHEM 111 & 113	General Chemistry I and General Chemistry Lab I or AP/OTH Credit in General Chem I and General Chem Lab I
CHEM 122 & 124 or CHEM 112 & 114	General Chemistry II and General Chemistry Lab II or AP/OTH credit in General Chem II and General Chem Lab II
<i>Select 1 from:</i>	
PHYS 101 & PHYS 103	Honors Mechanics (with lab) and Mechanics Discussion
PHYS 111	Honors Mechanics (with lab)
<i>Select 1 from:</i>	
PHYS 102 & PHYS 104	Electricity & Magnetism (with Lab) and E&M Discussion
PHYS 112	Honors Electricity and Magnetism (with Lab)
<i>Select 1 from:</i>	
EEPS 101	The Earth
EEPS 107	The Science of Climate Change
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 or CAAM 210	Introduction to Computation in EEPS or 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 2022 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 & CHEM 213	Organic Chemistry I and Discussion I
CHEM 212 & CHEM 214	Organic Chemistry II and Discussion II
EEPS 390 or EEPS 391	Geology Field Camp or Earth Science Field Experience
MATH 212	Multivariable Calculus
PHYS 201	Waves, Light, and Heat
STAT 280 or STAT 180	Elementary Applied Statistics or AP/OTH Credit in Statistics

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

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

### Area of Specialization: Geoscience

Select at least 1 course from each of the following 5 fields (see 2022 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 & CHEM 213	Organic Chemistry I and Discussion
CHEM 212 & CHEM 214	Organic Chemistry II Discussion
EEPS 390 or EEPS 391	Geology Field Camp or Earth Science Field Experience
MATH 212	Multivariable Calculus
PHYS 201	Waves, Light, and Heat
STAT 280 or STAT 180	Elementary Applied Statistics or AP/OTH Credit in Statistics

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

BIOS, CAAM, CEVE, CHEM, 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 2022 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

Multivariable Calculus

PHYS 201

Waves, Light, and Heat

PHYS 231

Elementary Physics Lab

STAT 280 or STAT 180

Elementary Applied Statistics

or AP/OTH Credit in Statistics

Any course at the 300-level (or above) from the following subject codes:  
ASTR, CAAM, CHEM, 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		
<b>FRESHMAN</b>		<b>15 credits</b>	<b>FRESHMAN</b>		<b>14 credits</b>
ESCI 115	Introduction to the Earth	4	EEPS 323	Earth Structure & Deformation	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			
<b>SOPHOMORE</b>		<b>14 credits</b>	<b>SOPHOMORE</b>		<b>14 credits</b>
EEPS 321	Earth System Evolution & Cycles	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
CAAM 210	Intro to Engineering Computation	3	MATH 211	Ord Differential Equations and Linear Algebra	3
ELECT	Specialization	3	DIST	Distribution Course	3
<b>JUNIOR</b>		<b>14 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
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
			OPEN	Open Elective	3
<b>JUNIOR</b>	<b>SUMMER</b>	<b>3 credits</b>			
EEPS 390 or EEPS 391	Geology Field Camp	3			
<b>SENIOR</b>		<b>16 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
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	The Science of Climate Change
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

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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 Engineering; and across Humanities and Social Sciences. This program is designed to foster the critical thinking required to address the increasing complexities facing our planet and develop solutions to enhance the environment.

## 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 (BIOS or EEPS). The major includes strong connections to the Humanities and Social Sciences.

## 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 and II and General Chemistry Lab I and II or AP/OTH Credit in General Chemistry I & II and General Chemistry Lab I & II
MATH 101 or MATH 105 MATH 102 or MATH 106 STAT 280 or STAT 305	Single Variable Calculus I or AP/OTH credit in Calculus I Single Variable Calculus II or AP/OTH credit in Calculus II Elementary Applied Statistics or Introduction to Statistics for Biosciences
BIOS 213 ENST 100/ARCH 105	Introductory Lab in Ecology and Evolution Environment, Culture and Society
Any 3-credit EEPS course offering at the 100-level	
EEPS 321 EEPS 325	Earth and Planetary Surface Environments Oceans, Atmospheres and Climate
1-2 courses (2-3 credit hours) from the Field Experience list in the 2022 GA	
1 advanced Social Sciences elective from the list in the 2022 GA	
1 advanced Humanities and Architecture elective from the list in the 2022 GA	
1 advanced Natural Sciences and Engineering elective from the list in the 2022 GA	
BIOS 495/EEPS 495	Seminar: Topics in Environmental Science

***Students must complete the requirements for one major concentration.***

### **Major Concentration: Earth Science**

*Select 2 courses from:*

EEPS 220	Intro to EEPS Computation
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 2022 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	Ecosystem 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		
<b>FRESHMAN</b>		<b>16 credits</b>	<b>FRESHMAN</b>		<b>14 credits</b>
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	DIST	Distribution Course	3
OPEN	Open Elective	3	LPAP	Lifetime Physical Activity Elective	1
<b>SOPHOMORE</b>		<b>14 credits</b>	<b>SOPHOMORE</b>		<b>16 credits</b>
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 100-199	100-level EEPS course	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
<b>JUNIOR</b>		<b>16 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
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
<b>SENIOR</b>		<b>15 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
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 and II and General Chemistry Lab I and II or AP/OTH Credit in General Chemistry I & II and General Chemistry Lab 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 & 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 & PHYS 104	Electricity and Magnetism (with lab) and E&M Discussion
PHYS 112	Honors Electricity and Magnetism
PHYS 126	General Physics II (with lab)

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

1-2 courses (2-3 credit hours) from the Field Experience list in the 2022 GA

1 advanced Social Sciences elective from the list in the 2022 GA

1 advanced Humanities and Architecture elective from the list in the 2022 GA

1 advanced Natural Sciences and Engineering elective from the list in the 2022 GA

*1 course from:*

BIOS 310	Independent Research for Biosciences 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 EEPS Computation
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 2022 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	Ecosystem 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 in 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	DIST	Distribution Course	3
OPEN	Open Elective	3	LPAP	Lifetime Physical Activity Elective	1
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

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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.

## Degree Offered

Health Sciences	BA
Sports Medicine and Exercise Physiology	BA

## Frank Advice

- 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.

## KINESIOLOGY

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- 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 & Community Health) or HEAL 119 (Introduction to Health & 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 TMC 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 TMC allows you to find experience in a research or medical setting for potentially every aspect of health or medicine.

## Health Sciences BA - 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 2022 GA

## Health Sciences BA

### SAMPLE DEGREE PLAN

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

FALL			SPRING		
<b>FRESHMAN</b>		<b>15 credits</b>	<b>FRESHMAN</b>		<b>16 credits</b>
HEAL 119	Introduction to Health & Wellness	3	ELECT	Health Sciences Elective	3
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	OPEN	Open Elective	3
			LPAP	Lifetime Physical Activity Elective	1
<b>SOPHOMORE</b>		<b>15 credits</b>	<b>SOPHOMORE</b>		<b>15 credits</b>
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
<b>JUNIOR</b>		<b>15 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
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
<b>SENIOR</b>		<b>15 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
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 - 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 2022 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		
<b>FRESHMAN</b>			<b>FRESHMAN</b>		
		<b>15 credits</b>			<b>16 credits</b>
HEAL 103	Nutrition	3	ELECT	Kinesiology Elective	3
KINE 120	Foundations of Kinesiology (Elective)	3	DIST	Distribution Course	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			LPAP	Lifetime Physical Activity Elective	1
<b>SOPHOMORE</b>			<b>SOPHOMORE</b>		
		<b>15 credits</b>			<b>15 credits</b>
ELECT	Kinesiology Elective	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
<b>JUNIOR</b>			<b>JUNIOR</b>		
		<b>16 credits</b>			<b>15 credits</b>
KINE 300	Human Anatomy & Lab	4	KINE 302	Biomechanics	3
KINE 319	Statistics for the Health Professional	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
<b>SENIOR</b>			<b>SENIOR</b>		
		<b>15 credits</b>			<b>15 credits</b>
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

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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

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## Frank Advice

- The Math Department website provides detailed information about choosing the proper math course for your first semester at Rice. Look under Academics > Undergraduate > Advising and Transfer Credit 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 Calculus (MATH 221-222) or Honors Differential Equations (MATH 220)\*. Strong students may additionally take Honors Linear Algebra (MATH 354).
- MATH 499 offers a non-lecture undergraduate research experience. 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](http://www.ams.org/programs/students/emp-reu) for more information)
- Not required but highly-recommended courses:
  - MATH 221 – Honors Calculus III
  - MATH 222 – Honors Calculus IV
  - MATH 354 – Honors Linear Algebra
  - MATH 356 – Abstract Algebra I
  - MATH 321 – Introduction to Analysis I or MATH 331 - Honors Analysis

## 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 & MATH 212

Ordinary Differential Equations and Linear Algebra *and* Multivariable Calculus

MATH 211 & MATH 222

Ordinary Differential Equations and Linear Algebra *and* Honors Calculus IV

MATH 220 & MATH 212

Honors Ordinary Differential Equations *and* Multivariable Calculus

MATH 220 & MATH 222

Honors Ordinary Differential Equations *and* Honors Calculus IV

MATH 221 & MATH 222

Honors Calculus III *and* 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		
<b>FRESHMAN</b>			<b>FRESHMAN</b>		
		<b>15 credits</b>			<b>16 credits</b>
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
<b>SOPHOMORE</b>			<b>SOPHOMORE</b>		
		<b>15 credits</b>			<b>15 credits</b>
MATH 211 or MATH 221	Ordinary Differential Equations and Linear Algebra or Honors Calculus III	3	MATH 212 or MATH 222	Multivariable Calculus or Honors Calculus IV	3
DIST	Distribution Course	3	MATH 354	Honors Linear Algebra	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
<b>JUNIOR</b>			<b>JUNIOR</b>		
		<b>15 credits</b>			<b>15 credits</b>
MATH 356	Abstract Algebra I	3	MATH 300+	Math Elective	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
<b>SENIOR</b>			<b>SENIOR</b>		
		<b>15 credits</b>			<b>15 credits</b>
MATH 321 or MATH 331	Intro to Analysis I or Honors Analysis	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/CAAM 423      Partial Differential Equations I

*Select 1 from:*

MATH 212      Multivariable Calculus  
 MATH 221 & MATH 222      Honors Calculus III and Honors Calculus IV

*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 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		
<b>FRESHMAN</b>		<b>15 credits</b>	<b>FRESHMAN</b>		<b>16 credits</b>
MATH 221	Honors Calculus III	3	MATH 222	Honors Calculus IV	3
FWIS	First Year Writing-Intensive Seminar	3	MATH 300+	Math Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
<b>SOPHOMORE</b>		<b>15 credits</b>	<b>SOPHOMORE</b>		<b>15 credits</b>
MATH 321 or MATH 331	Intro to Analysis I or Honors Analysis	3	MATH 322	Intro to Analysis II	3
MATH 354	Honors Linear Algebra	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
<b>JUNIOR</b>		<b>15 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
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
<b>SENIOR</b>		<b>15 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
MATH 401	Differential Geometry of Curves and Surfaces	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

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The Neuroscience BA degree is an interdisciplinary program that is designed to provide multiple paths for students interested in the brain and how it works. This degree path 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.

This program will equip students to explore key issues, analyze and interpret neuro-scientific data, and both understand and apply experimental methods that expand our understanding of brain and neural function. Research experiences are highly encouraged with a wide range of investigators at Rice and across the street in the TMC.

The neuroscience minor involves participation in core and elective courses selected from the major as well as research in active faculty laboratories throughout Rice and the TMC.

## Degrees Offered

Neuroscience	BA, Minor
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## Frank Advice

- Our website ([www.neuroscience.rice.edu](http://www.neuroscience.rice.edu)) contains all the information that you need for the major and minor. It 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, CAAM 210 is a foundational course that acts 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, simplifying work in higher level courses, etc.).



## Neuroscience BA - Requirements

BIOS 201	Introductory Biology I
CAAM 210	Introduction to Engineering Computation
CHEM 121 & CHEM 123 or CHEM 111 & CHEM 113	General Chemistry I and General Chemistry Lab I or AP/OTH Credit in General Chemistry I and Lab
CHEM 122 & CHEM 124 or CHEM 112 & CHEM 114	General Chemistry II and General Chemistry Lab II or AP/OTH Credit in General Chemistry II and Lab
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

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	Fundamentals of Cellular and Molecular Neuroscience
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 2 courses (minimum of 2 credit hours) from:

BIOS 415	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

Select 4 courses from the Elective Requirements list in the 2022 GA

\*MATH 111 and MATH 112 may be substituted for MATH 101.

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		
14 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
BIOS 112	Intro Biological Research Challenges	1	LPAP	Lifetime Physical Act. Elective	1
FWIS	First Year Writing-Intensive Seminar	3	OPEN	Open Elective	3
SOPHOMORE			SOPHOMORE		
15 credits			17 credits		
CAAM 210	Intro to Engineering Computation	3	STAT 305	Intro to Stat for Biosciences	4
BIOS 212	Intermediate Expl. Neuro.	2	NEUR 380	Fund. Neuroscience Systems	3
PHYS 125	General Physics with Lab I	4	PHYS 126	General Physics with Lab II	4
NEUR 385	Fundamentals of Neuroscience	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR			JUNIOR		
16 credits			16 credits		
NEUR 385	Fund. Cellular/Molecular Neuro.	3	ELECT	Required Elective Course	3
LAB	Required Lab	1	NEUR 362	Cognitive Neuroscience	3
NEUR 383	Introduction to NeuroEngineering	3	LAB	Required 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
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
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	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 2022 GA

Select at least 1 course (3 credit hours) from the Natural Science and Engineering area of specialization list in the 2022 GA. BIOS 385 may be used to fulfill this requirement.

### **Area of Specialization: Natural Sciences and Engineering**

BIOS 385

Fundamentals of Cellular and Molecular Neuroscience

Select a minimum of 3 courses (9 credit hours) from the Natural Science and Engineering area of specialization list in the 2022 GA

Select at least 1 course (3 credit hours) from the Humanities and Social Science area of specialization list in the 2022 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

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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

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## Frank Advice

- 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, 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 regularly distributed to majors via email.
- 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	Ordinary Differential Equations and Linear Algebra
or MATH 220	or Honors Ordinary Differential Equations
or MATH 221	or Honors Calculus III
MATH 212 or MATH 222	Multivariable Calculus or Honors Calculus IV

*Select 1 from:*

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

*Select 1 from:*

PHYS 102 & 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 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:*

CAAM 210	Introduction to Engineering Computation
1 course from CAAM 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		
<b>FRESHMAN</b>			<b>FRESHMAN</b>		
		<b>14 credits</b>			<b>16 credits</b>
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
<b>SOPHOMORE</b>			<b>SOPHOMORE</b>		
		<b>15 credits</b>			<b>16 credits</b>
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
<b>JUNIOR</b>			<b>JUNIOR</b>		
		<b>13 credits</b>			<b>16 credits</b>
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
PHYS 311	Intro to Quantum Physics I	3	CAAM 210	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
<b>SENIOR</b>			<b>SENIOR</b>		
		<b>15 credits</b>			<b>15 credits</b>
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	Ordinary Differential Equations and Linear Algebra
or MATH 220	or Honors Ordinary Differential Equations
or MATH 221	or Honors Calculus III
MATH 212 or MATH 222	Multivariable Calculus or Honors Calculus IV

Select 1 from:

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

Select 1 from:

PHYS 102 & 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 & PHYS 493	Undergraduate Research and Undergraduate Research Seminar
PHYS 492 & 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	Introduction to Quantum Physics II
or ELEC 361	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 & ELEC 244	Signals, Systems, and Transforms <i>and</i> Analog Circuits
or ELEC 243	Laboratory or Electronic Measurement Systems
ELEC 305	Introduction to Physical Electronics II
MATH 381 or CAAM 336	Introduction to Partial Differential Equations 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 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 & CHEM 213	Organic Chemistry I and Organic Chemistry Discussion I
MATH 381 <i>or</i> CAAM 336	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
CAAM 210	Introduction to Engineering Computation
CAAM 334 <i>or</i> CAAM 335	Matrix Analysis for Data Science <i>or</i> Matrix Analysis
CAAM 336	Differential Equations in Science and Engineering
CAAM 453	Numerical Analysis I
COMP 130 <i>or</i> COMP 140	Elements of Algorithms and Computation <i>or</i> Computational Thinking

*Select 2 courses from:*

CAAM 435/MATH 435	Dynamical Systems
CAAM 454	Iterative Methods for Systems of Equations and Unconstrained Optimization
CAAM 519	Computational Science I
CAAM 520	Computational Science II
CAAM 536/CEVE 555	Numerical Methods for Partial Differential Equations
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> CAAM 336	Introduction to Partial Differential Equations <i>or</i> Differential Equations in Science and Engineering
MATH 382 <i>or</i> CAAM 334 <i>or</i> CAAM 335	Computational Complex Analysis <i>or</i> Matrix Analysis for Data Science <i>or</i> Matrix Analysis

## Physics BS - General Physics Concentration

## SAMPLE DEGREE PLAN

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

FALL			SPRING		
<b>FRESHMAN</b>		<b>14 credits</b>	<b>FRESHMAN</b>		<b>16 credits</b>
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
<b>SOPHOMORE</b>		<b>15 credits</b>	<b>SOPHOMORE</b>		<b>16 credits</b>
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
<b>JUNIOR</b>		<b>16 credits</b>	<b>JUNIOR</b>		<b>15 credits</b>
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
CAAM 336	Differential Equations in Science and Engineering	3	PHYS 332	Junior Physics Lab II	2
OPEN	Open Elective	3	CAAM 335	Matrix Analysis	3
OPEN	Open Elective	3	OPEN	Open Elective	3
<b>SENIOR</b>		<b>15 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
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 & PHYS 103  
PHYS 111Mechanics (with Lab) and Mechanics Discussion  
Honors Mechanics (with Lab)*Select 1 from:*PHYS 102 & 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  
PHYS 201  
PHYS 202Multivariable Calculus or Honors Calculus IV  
Waves, Light, and Heat  
Modern Physics

Select a minimum of 3 courses 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 <i>or</i> MATH 220 <i>or</i> MATH 221	Ordinary Differential Equations and Linear Algebra <i>or</i> Honors Ordinary Differential Equations <i>or</i> Honors Calculus III
MATH 212 <i>or</i> MATH 222	Multivariable Calculus <i>or</i> Honors Calculus IV
<i>Select 1 from:</i>	
PHYS 101 & PHYS 103 PHYS 111	Mechanics (with Lab) and Mechanics Discussion Honors Mechanics (with lab)
<i>Select 1 from:</i>	
PHYS 102 & PHYS 104  PHYS 112	Electricity and Magnetism (with Lab) and E&M 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
ASTR 230	Astronomy Lab
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxy and Cosmo
ASTR 400	Undergraduate Research Seminar (two semesters required)
<i>Select 1 course 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		
<b>FRESHMAN</b>			<b>FRESHMAN</b>		
		<b>14 credits</b>			<b>16 credits</b>
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
<b>SOPHOMORE</b>			<b>SOPHOMORE</b>		
		<b>16 credits</b>			<b>16 credits</b>
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
<b>JUNIOR</b>			<b>JUNIOR</b>		
		<b>16 credits</b>			<b>13 credits</b>
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
ASTR 350	Intro to Astrophysics - Stars	3	ASTR 360	Intro to Astrophysics - Galaxy and Cosmo	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
<b>SENIOR</b>			<b>SENIOR</b>		
		<b>16 credits</b>			<b>13 credits</b>
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	Ordinary Differential Equations and Linear Algebra
or MATH 220	or Honors Ordinary Differential Equations
or MATH 221	or Honors Calculus III
MATH 212 or MATH 222	Multivariable Calculus or Honors Calculus IV
<i>Select 1 from:</i>	
PHYS 101 & PHYS 103	Mechanics (with Lab) and Mechanics Discussion
PHYS 111	Honors Mechanics (with Lab)
<i>Select 1 from:</i>	
PHYS 102 & 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 302	Intermediate Electrodynamics
PHYS 311	Introduction to Quantum Physics I
PHYS 425	Statistical and Thermal Physics
PHYS 491 & PHYS 493	Undergraduate Research and Undergraduate Research Seminar
PHYS 492 & PHYS 494	Undergraduate Research and Undergraduate Research Seminar
ASTR 230	Astronomy Lab
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxy and Cosmo
ASTR 400	Undergraduate Research Seminar (two semesters required)
<i>Select 3 courses 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

## PHYSICS AND ASTRONOMY

## Astrophysics BS

## 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		
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		
14 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 - Galaxy and Cosmos	3
ASTR 350	Intro to Astrophysics - Stars	3	PHYS 312	Intro to Quantum Physics II	3
OPEN	Open Elective	1	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
DIST	Distribution Course	3	OPEN	Open Elective	3
			OPEN	Open Elective	3

## Astronomy Minor - 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:*

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

*Select 1 from:*

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

*Select 1 from:*

ASTR 101                      Stars, Galaxies and the Universe  
 ASTR 102                      Exploration of the Solar System

*Select 3 from\*:*

ASTR 230                      Astronomy Lab  
 ASTR 243                      Living With a Star: The Physics of the Sun-Earth Connection  
 ASTR 350                      Introduction to Astrophysics - Stars  
 ASTR 360                      Introduction to Astrophysics - Galaxy and Cosmo  
 ASTR 408                      Statistical Methods in Physics and Astronomy  
 ASTR 461                      Independent Research in Astronomy

ASTR 400                      Undergraduate Research Seminar

\*Depending upon the choice of the three advanced classes, additional prerequisites in COMP, PHYS and/or MATH may be required.



## DEGREE REQUIREMENTS

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**From Rice University's General Announcements, in order to graduate from Rice University, all students must:**

- Be registered at Rice University full-time for at least four full fall and/or spring semesters.
- Complete the requirements of at least one major and degree program.
- Complete at least 120 semester credit hours (some degree programs require more than a minimum 120 credit hours).
- Complete at least 60 semester credit hours at Rice University.
- Complete at least 48 semester credit hours in upper-level coursework (courses at the 300-level or above).
- Complete more than half of the upper-level coursework (at least 25 of the 48 minimum semester credit hours) at Rice University.
- Complete more than half of the upper-level coursework required by the declared major(s) at Rice University (as designated by the department or program, some may specify a higher proportion).
- Complete all Rice coursework with a cumulative grade point average of at least 1.67 or higher.
- Complete all Rice coursework that satisfy major, minor and/or certificate requirements (as designated by the department or program):
  - with a cumulative grade point average of at least 2.00 or higher.
  - with the standard letter grade earned (not on a Pass/Fail basis).
- Satisfy the Writing and Communication Requirement (see below).
- Complete courses to satisfy the Distribution Requirements (see below).
- Satisfy the Analyzing Diversity Requirement (see below)
- Complete one Lifetime Physical Activity Program (LPAP) course for one credit hour. Students with disabilities may make special arrangements to satisfy this requirement.
- Otherwise be a student in good academic and disciplinary standing and not under investigation.

# DEGREE REQUIREMENTS

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## **Writing and Communication Requirement**

All students must complete and pass a First-Year Writing-Intensive Seminar (FWIS). An FWIS is a content-based, 3-credit hour seminar open only to first-year students that can focus on any topic, and in which writing and communication pedagogy plays a significant role in assignments and grading.

## **Distribution Requirements**

Distribution courses introduce the knowledge, intellectual skills and habits of thought characteristic of disciplines or of inquiry across disciplines within three main areas: humanities, social sciences, and natural sciences and engineering. They are broad-based, accessible to non-majors, and provide a foundation that enables students to integrate knowledge from multiple perspectives. No single course is expected to fulfill all the criteria or goals of a distribution group. Courses that presume students' special expertise or that teach techniques or career-based skills without exposure to modes of analysis and scholarship in the relevant discipline are not eligible for distribution credit. Research or independent study courses and internships and practica are also excluded.

Each student is required to complete **at least 3 courses of designated distribution courses of at least 3 credit hours each in each of Distribution Groups I, II, and III**. The 3 courses in each group must include courses in at least two departments in that group. Divisional or interdisciplinary designations, e.g., HUMA or NSCI, count as departments.

Students must complete the distribution requirements in each group by taking courses that are designated as a distribution course at the time of course registration, as published in that semester's *Course Offerings*.

## **Analyzing Diversity Requirement**

Beginning Fall 2022, all matriculated students must complete and pass one course of three or more credit hours in the area of Analyzing Diversity. Such courses primarily focus on how difference is understood across human societies, on how those understandings have changed over time, and on the consequences of those understandings for human development. Courses meeting this requirement equip students with foundational know-how in the critical study of matters related to diversity, and prepare them to apply such knowledge in other areas of study as they advance at the university.

# MAJOR ADVISORS

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## BIOSCIENCES

### Prospectives, Freshmen and Undeclared Sophomores

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

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### Declared Majors and Minors

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#### Study Abroad Transfer Credit

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## EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES

### Environmental Earth Science Concentration and Minors

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### Geoscience and Planetary Sciences Concentrations and Minors

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### Ecology and Evolutionary Biology Concentration

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# MAJOR ADVISORS

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## KINESIOLOGY

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### Sports Medicine and Exercise Physiology

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## MATHEMATICS

### Major and Minor Advisors

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### Transfer Credit

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# MAJOR ADVISORS

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## PHYSICS AND ASTRONOMY

### Major Advisors

#### Astrophysics/Astronomy

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#### Chemical Physics

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### Minor Advisors

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