NATURAL SCIENCES

New Student Advising
Fall 2020

Welcome to the Rice University Class of 2024!

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

CONTENTS

GENERAL ADVICE

DEPARTMENTS & PROGRAMS

REFERENCE INFORMATION

ADVISORS

As an incoming freshman at Rice, you have many advisors available to you. Your College Magister has chosen four Divisional Advisors who are associated with your residential college, one 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

Many Rice freshmen 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

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

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

Participation in science 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. 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

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

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. This year, **Freshman Health Professions Advising Orientation** will be held virtually on **Wednesday, August 26** at 6:30 p.m.

STUDY ABROAD

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) for all of the information you need to start planning your study abroad experience.

DEPARTMENTS AND PROGRAMS

In this section, you will find information about each of our departments and programs, including advice and tips to help you choose your major and design your degree plan. The School of Natural Sciences offers 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

The BioSciences undergraduate curricula provide undergraduate students with numerous rigorous, balanced, yet flexible paths towards either a Bachelor of Arts (BA) or Bachelor of Science (BS) degree in a wide range of focal areas within the life sciences. The major in **Biosciences** is divided into four distinct major concentrations: **Biochemistry, Cell Biology and Genetics, Ecology and Evolutionary Biology, and Integrative Biology**. Students declaring a major in Biosciences must select one of these four major concentrations.

All major concentrations share the same basic structure: core requirements include introductory coursework in the natural sciences and engineering, including biology (BIOS), chemistry (CHEM), physics (PHYS), math (MATH), and statistics (STAT); a combination of required and elective lecture and laboratory courses in biology (BIOS), with a focus on coursework within the area of major concentration; at least one additional lecture course in natural sciences or engineering; and a capstone biology (BIOS) course within the major concentration area.

All major concentrations offer a BA and a BS option. The BA degrees offer a rigorous biological curriculum suitable for many career paths while allowing the flexibility for extended academic exploration in other areas. The BS degrees include similar academic rigor with the addition of experience conducting original research. While undergraduate research is required for the BS degrees, all students regardless of their major are welcome and encouraged to participate in undergraduate research, availing themselves of the numerous research opportunities at Rice and in the Houston community.

Both the BA and BS degrees with the major in Biosciences and all major concentrations will provide students with significant biological content knowledge and the skills to evaluate the scientific literature, design experiments, and collect, analyze and communicate data. These degrees will prepare students 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.

BIOSCIENCES

In addition, a minor in **Biochemistry and Cell Biology** and a minor **in Ecology and Evolutionary Biology** are offered for students interested in these fields but who may be majoring in other areas. The minor in Biochemistry and Cell Biology includes many of the life science core courses required for the health professions.

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 335 (Integrative Animal Physiology), BIOS 332 (Ecology), and BIOS 334 (Evolution) depending on your interests.
- Freshmen 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.

continued

BIOSCIENCES

Frank Advice *continued*

- Research participation is encouraged for all students and required for the BS degrees.
    - Visit the website 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 to enroll. This is our main venue for up to date information about research opportunities at Rice, the Texas Medical Center and beyond.
- Not required but highly-recommended courses:
    - BIOS 118/BIOS 119—Freshman Seminar in Local Biology Research
    - FWIS 115 or NSCI 120—lab courses for first year students
- Highly qualified students may apply to the Biochemistry and Cell Biology BA-MA-PhD program track. If you are interested in this option, you can find more information on the Biosciences website or talk to your advisor.

Biosciences BA

Major Concentration: Biochemistry

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

CHEM 122/CHEM 124*	General Chemistry II and Lab
CHEM 211/CHEM 213	Organic Chemistry I and discussion
PHYS 126*	General Physics II (with Lab)
BIOS 301	Biochemistry I
BIOS 302	Biochemistry II
BIOS 352	Physical Chemistry for the Biosciences

Select two courses from the Elective Lecture Courses in Biochemistry list for the Major Concentration in Biochemistry in the 2020 GA.

BIOS 211	Intermediate Experimental Biosciences
BIOS 311	Advanced Experimental Biosciences

Select two courses from the Elective Lab Courses in Biochemistry list for the Major Concentration in Biochemistry in the 2020 GA.

Select one course from the Capstone Requirement list for the Major Concentration in Biochemistry in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BA

SAMPLE DEGREE PLAN

Major Concentration: Biochemistry

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	DIST	Distribution Course	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**17 credits**
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 300+	Elective Lecture (see GA)	3
CHEM 211	Organic Chemistry I	3	PHYS 126	General Physics II (with lab)	4
CHEM 213	Organic Chemistry Discussion I	0	STAT 305	Intro to Statistics for Biosciences	4
PHYS 125	General Physics (with lab)	4	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
BIOS 301	Biochemistry I	3	BIOS 302	Biochemistry II	3
BIOS 311	Advanced Experimental Biosciences	3	BIOS Lab 300+	Elective Lab	3
NSCI/ENG	200+ level Elective	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**16 credits**	**SENIOR**		**15 credits**
BIOS 352	Physical Chemistry for Biosciences	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			

Biosciences BA

Major Concentration: Cell Biology and Genetics

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

CHEM 122/CHEM 124*	General Chemistry II and lab
CHEM 211/CHEM 213	Organic Chemistry I and discussion
BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 344	Molecular Biology and Genetics

Select three courses from the Elective Lecture Courses in Cell Biology and Genetics list for the Major Concentration in Cell Biology and Genetics in the 2020 GA.

BIOS 211	Intermediate Experimental Biosciences

Select three courses from the Elective Laboratory Courses list for the Major Concentration in Cell Biology and Genetics in the 2020 GA.

Select one course from the Capstone Requirement list for the Major Concentration in Cell Biology and Genetics in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BA

SAMPLE DEGREE PLAN

Major Concentration: Cell Biology and Genetics

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	DIST	Distribution Course	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**16 credits**
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 300+	Elective Lecture	3
CHEM 211	Organic Chemistry I	3	NSCI/ENG	200+ level Elective	3
CHEM 213	Organic Chemistry Discussion I	0	STAT 305	Intro to Statistics for Biosciences	4
PHYS 125	General Physics (with lab)	4	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		**15 credits**	**JUNIOR**		**16 credits**
BIOS 301	Biochemistry I	3	BIOS 341	Cell Biology	3
BIOS Lab 300+	Elective Lab	3	BIOS 344	Molecular Biology and Genetics	3
DIST	Distribution Course	3	BIOS Lab 300+	Elective Lab	1
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SENIOR		**13 credits**	**SENIOR**		**15 credits**
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 BA

Major Concentration: Ecology and Evolutionary Biology

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

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

Select three courses from the Elective Lecture Courses in Ecology and Evolutionary Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

Select two courses from the Elective Courses in Biochemistry and Cell Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

BIOS 213	Introductory Lab in Ecology and Evolution

Select two courses from the Elective Laboratory Courses in Ecology and Evolutionary Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

Select one course from the Elective Laboratory Course in Biochemistry and Cell Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

Select one course from the Capstone Requirement list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BA

SAMPLE DEGREE PLAN

Major Concentration: Ecology and Evolutionary Biology

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**16 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	MATH 102	Single Variable Calculus II	3
CHEM 123	General Chemistry I Lab	1	LPAP	Lifetime Physical Activity Elective	1
MATH 101	Single Variable Calculus I	3	DIST	Distribution Course	3
FWIS	First Year Writing-Intensive Seminar	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**14 credits**
BIOS 213	Intro Lab in Ecology & Evol Biol	2	BIOS 334	Evolution	3
NSCI/ENG	200+ level Elective	3	BIOS Lab 300+	Elective Lab	1
PHYS 125	General Physics (with lab)	4	STAT 305	Intro to Statistics for Biosciences	4
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		**14 credits**	**JUNIOR**		**15 credits**
BIOS 332	Ecology	3	BIOS 338	Analysis and Visualization of Biological Data	3
BIOS 312	Advanced Communication in the Biological Sciences	2	BIOS 300+	Elective Lecture	3
BIOS Lab 300+	Elective Lab	3	BIOS 300+	Elective Lecture	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**16 credits**	**SENIOR**		**15 credits**
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
BIOS 400+	Capstone Course	3	BIOS 300+	Elective Lecture	3
BIOS Lab 300+	Elective Lab	1	OPEN	Open Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

Biosciences BA

Major Concentration: Integrative Biology

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

Select one lecture course offered by the School of Natural Sciences or the School of Engineering at the 200-level or above in the 2020 GA.

CHEM 122/CHEM 124*	General Chemistry II and lab
CHEM 211/CHEM 213	Organic Chemistry I and discussion
BIOS 301	Biochemistry I
BIOS 332	Ecology
BIOS 334	Evolution
BIOS 341	Cell Biology

Select one course from the Elective Lecture Course in Ecology and Evolutionary Biology list for the Major Concentration in Integrative Biology in the 2020 GA.

Select one course from the Elective Lecture Course in Biochemistry and Cell Biology list for the Major Concentration in Integrative Biology in the 2020 GA.

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

Select two courses from the Elective Laboratory Courses list for the Major Concentration in Integrative Biology list in the 2020 GA.

Select one course from the Capstone Requirement list for the Major Concentration in Integrative Biology list in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BA

SAMPLE DEGREE PLAN

Major Concentration: Integrative Biology

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry 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
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 213	Intro Lab in Ecology & Evolutionary Biology	2
CHEM 211	Organic Chemistry I	3	NSCI/ENG	200+ level Elective	3
CHEM 213	Organic Chemistry I Discussion	0	STAT 305	Intro to Statistics for Biosciences	4
PHYS 125	General Physics (with lab)	4	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
BIOS 301	Biochemistry I	3	BIOS 334	Evolution	3
BIOS 332	Ecology	3	BIOS 341	Cell Biology	3
BIOS Lab 300+	Elective Lab	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**16 credits**	**SENIOR**		**15 credits**
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			

Biosciences BS - Requirements

Major Concentration: Biochemistry

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

CHEM 122/CHEM 124*	General Chemistry II and Lab
CHEM 211/CHEM 213	Organic Chemistry I and discussion
PHYS 126*	General Physics II (with Lab)
BIOS 301	Biochemistry I
BIOS 302	Biochemistry II
BIOS 352	Physical Chemistry for the Biosciences

Select two courses from the Elective Lecture Courses in Biochemistry list for the Major Concentration in Biochemistry list in the 2020 GA.

BIOS 211	Intermediate Experimental Biosciences
BIOS 311	Advanced Experimental Biosciences

Select one course from the Elective Laboratory Course list for the Major Concentration in Biochemistry list in the 2020 GA.

Select one 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 one course from the Capstone Requirement list for the Major Concentration in Biochemistry list in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BS

SAMPLE DEGREE PLAN

Major Concentration: Biochemistry

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	DIST	Distribution Course	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**17 credits**
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 300+	Elective Lecture	3
CHEM 211	Organic Chemistry I	3	PHYS 126	General Physics II (with lab)	4
CHEM 213	Organic Chemistry Discussion I	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			
JUNIOR		**15 credits**	**JUNIOR**		**14 credits**
BIOS 301	Biochemistry I	3	BIOS 302	Biochemistry II	3
BIOS 310	Independent Research	3	BIOS 310	Independent Research	3
NSCI/ENG	200+ level Elective	3	BIOS 311	Advanced Experimental Biosciences	2
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**16 credits**	**SENIOR**		**15 credits**
BIOS 352	Physical Chemistry for Biosciences	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			

Biosciences BS - Requirements

Major Concentration: Cell Biology and Genetics

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

CHEM 122/CHEM 124*	General Chemistry II and lab
CHEM 211/CHEM 213	Organic Chemistry I and discussion
BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 344	Molecular Biology and Genetics

Select three courses from the Elective Lecture Courses in Cell Biology and Genetics list for the Major Concentration in Cell Biology and Genetics list in the 2020 GA.

BIOS 211	Intermediate Experimental Biosciences

Select two courses from the Elective Laboratory Courses list for the Major Concentration in Cell Biology and Genetics list in the 2020 GA.

Select one 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 one course from the Capstone Requirement list for the Major Concentration in Cell Biology and Genetics list in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BS

SAMPLE DEGREE PLAN

Major Concentration: Cell Biology and Genetics

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	DIST	Distribution Course	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**16 credits**
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 300+	Elective Lecture	3
CHEM 211	Organic Chemistry I	3	BIOS 310	Independent Research	3
CHEM 213	Organic Chemistry Discussion I	0	STAT 305	Intro to Statistics for Biosciences	4
PHYS 125	General Physics (with lab)	4	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		**15 credits**	**JUNIOR**		**16 credits**
BIOS 301	Biochemistry I	3	BIOS 341	Cell Biology	3
BIOS 310	Independent Research	3	BIOS 344	Molecular Biology and Genetics	3
NSCI/ENG	200+ level Elective	3	BIOS 310	Independent Research	3
DIST	Distribution Course	3	BIOS Lab 300+	Elective Lab	1
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
SENIOR		**13 credits**	**SENIOR**		**15 credits**
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

Major Concentration: Ecology and Evolutionary Biology

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

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

Select three courses from the Elective Lecture Courses in Ecology and Evolutionary Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

Select two courses from the Elective Lecture Courses in Biochemistry and Cell Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

BIOS 213	Introductory Lab in Ecology and Evolution

Select one course from the Elective Laboratory Course in Ecology and Evolutionary Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

Select one course from the Elective Laboratory Course in Biochemistry and Cell Biology list for the Major Concentration in Ecology and Evolutionary Biology in the 2020 GA.

Select one 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 one course from the Capstone Requirement list for the Major Concentration in Ecology and Evolutionary Bioogy in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BS

SAMPLE DEGREE PLAN

Major Concentration: Ecology and Evolutionary Biology

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

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

Biosciences BS - Requirements

Major Concentration: Integrative Biology

CHEM 121/CHEM 123*	General Chemistry I and Lab
MATH 101*	Single Variable Calculus I
MATH 102*	Single Variable Calculus II
PHYS 125*	General Physics I (with Lab)
STAT 305	Introduction to Statistics for Biosciences
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II

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

CHEM 122/CHEM 124*	General Chemistry II and lab
CHEM 211/CHEM 213	Organic Chemistry I and discussion
BIOS 301	Biochemistry I
BIOS 332	Ecology
BIOS 334	Evolution
BIOS 341	Cell Biology

Select one course from the Elective Lecture Course in Ecology and Evolutionary Biology list for the Major Concentration in Integrative Biology in the 2020 GA.

Select one course from the Elective Lecture Course in Biochemistry and Cell Biology list for the Major Concentration in Integrative Biology in the 2020 GA.

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

Select one course from the Elective Laboratory Course list for the Major Concentration in Integrative Biology list in the 2020 GA.

Select one 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 one course from the Capstone Requirement list for the Major Concentration in Integrative Biology list in the 2020 GA.

* See 2020 GA for acceptable course substitutions including AP credit.

Biosciences BS

SAMPLE DEGREE PLAN

Major Concentration: Integrative Biology

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Intro Biology I	3	BIOS 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry 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
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
BIOS 211	Intermediate Experimental Biosciences	2	BIOS 213	Intro Lab in Ecology & Evol Biol	2
CHEM 211	Organic Chemistry I	3	NSCI/ENG	200+ level Elective	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			
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
BIOS 301	Biochemistry 1	3	BIOS 334	Evolution	3
BIOS 332	Ecology	3	BIOS 341	Cell Biology	3
BIOS Lab 300+	Elective Lab	1	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			
SENIOR		**15 credits**	**SENIOR**		**15 credits**
BIOS 300+	Elective Lecture	3	BIOS 300+	Elective Lecture	3
DIST	Distribution Course	3	BIOS 400+	Capstone Course	3
OPEN	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* *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 125/126*	General Physics I and II (with lab)
CHEM 121/122/123/124*	General Chemistry I and II and General Chemistry Lab I and II
CHEM 211/212/213/214*	Organic Chemistry I and II and Organic Chemistry Discussion
CHEM 215 *or* CHEM 365	Organic Chemistry Lab
BIOS 201	Introductory Biology I
BIOS 301	Biochemistry I
BIOS 341	Cell Biology
BIOS 211	Intermediate Experimental Biosciences

Select one course from the Lecture Course Requirement list in the 2020 GA.

* MATH 111/112 may substitute for MATH 101
CHEM 151/152/153/154 may substitute for CHEM 121/122/123/124
CHEM 320 may substitute for CHEM 212
PHYS 101/102/103/104 *or* PHYS 111/112 may substitute for PHYS 125/126

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 four 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 391	Transfer Credit in Ecology and Evolutionary Biology
BIOS 423	Conservation Biology
BIOS 431	Biology of Infectious Diseases

CHEMICAL PHYSICS

The Chemical Physics degree is jointly offered by the Department of Chemistry and the Department of Physics and Astronomy. It is designed for students with 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.
- If you have chemistry AP credit and are confident in your background and ability to focus, you should be fine taking CHEM 211 as a freshman. If you are unsure whether to go straight to organic, start off going to both CHEM 151 and CHEM 211. Stay in the one that feels appropriate and drop the other. CHEM 211 is offered both semesters, so you can alternatively start organic in the spring (taking either CHEM 151 or no chemistry in the fall).
- 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 BS - Requirements

CHEM 121	General Chemistry I
CHEM 123	General Chemistry Laboratory I
Select one from:	
CHEM 122/CHEM 124	General Chemistry II and General Chemisty Laboratory II
CHEM 201/205	Advanced Topics in General Chemistry and Advanced Topics in General Chemistry Laboratory
Select one from:	
CHEM 211/CHEM 213	Organic Chemistry I and Organic Chemistry Discussion
CHEM 319	Organic Chemistry I
CHEM 215 *or* CHEM 365	Organic Chemistry Lab *or* Organic Chemistry Lab
CHEM 301/CHEM 302	Physical Chemistry I and II
Select one from:	
PHYS 101/PHYS 103	Mechanics (with Lab) and Mechanics Discussion
PHYS 111	Honors Mechanics (with Lab)
Select one 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 *or* MATH 220 *or* MATH 221	Ordinary Differential Equations and Linear Algebra *or* Honors Ordinary Differential Equations *or* Honors Calculus III
MATH 212 *or* MATH 222	Multivariable Calculus *or* Honors Calculus IV
Select three 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 two courses from:	
CHEM 366	Inorganic Chemistry Lab
CHEM 367	Materials Chemistry Lab
CHEM 368	Chemical Measurement Lab
CHEM 491 *or* PHYS 461 *or* PHYS 462	Research for Undergraduates (up to 2 hours) *or* Independent Research
PHYS 332	Junior Physics Lab II

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

Chemical Physics BS

SAMPLE DEGREE PLAN

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

FALL

FRESHMAN		17 credits
CHEM 121	General Chemistry I	3
CHEM 123	General Chemistry Lab I	1
PHYS 101	Mechanics (with lab)	4
PHYS 103	Mechanics Discussion	0
MATH 101	Single Variable Calculus I	3
FWIS	First Year Writing-Intensive Seminar	3
OPEN	Open Elective	3

SOPHOMORE		15 credits
CHEM 211	Organic Chemistry I	3
CHEM 213	Organic Chemistry Discussion	0
PHYS 201	Waves, Light and Heat	3
MATH 212	Multivariable Calculus	3
DIST	Distribution Course	3
OPEN	Open Elective	3

JUNIOR		16 credits
CHEM 301	Physical Chemistry I	3
PHYS 301	Intermediate Mechanics	4
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

SENIOR		17 credits
CHEM 430	Quantum Chemistry	3
CHEM 491	Research for Undergraduates	2
MATH/ CAAM	300+ level Elective	3
OPEN	Open Elective	3
OPEN	Open Elective	3
OPEN	Open Elective	3

SPRING

FRESHMAN		17 credits
CHEM 122	General Chemistry II	3
CHEM 124	General Chemistry Lab II	1
PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 104	E & M Discussion	0
MATH 102	Single Variable Calculus II	3
DIST	Distribution Course	3
OPEN	Open Elective	3

SOPHOMORE		16 credits
CHEM 215	Organic Chemistry Lab	2
CHEM 360	Inorganic Chemistry	3
PHYS 202	Modern Physics	3
PHYS 231	Elementary Physics Lab	1
MATH 211	Differential Equations	3
DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1

JUNIOR		18 credits
CHEM 302	Physical Chemistry II	3
PHYS 302	Intermediate Electrodynamics	4
PHYS 332	Junior Physics Lab II	2
MATH/ CAAM	300+ level Elective	3
DIST	Distribution Course	3
OPEN	Open Elective	3

SENIOR		18 credits
CHEM 420	Classical & Statistical Thermodynamics	3
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3
OPEN	Open Elective	3
OPEN	Open Elective	3

CHEMISTRY

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

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

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

Degrees Offered

Chemistry	BS, BA

CHEMISTRY

Frank Advice

- If you have chemistry AP credit and are confident in your background and ability to focus, you should be fine taking CHEM 211 as a freshman. If you are unsure whether to go straight to organic, start off going to both CHEM 151 and CHEM 211. Stay in the one that feels appropriate and drop the other.
- 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 Texas Medical Center.

Chemistry BA - Requirements

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

Select one from:

- CHEM 122/CHEM 124 General Chemistry II and Laboratory
- CHEM 201/CHEM 205 Advanced Topics in General Chemistry and Laboratory

BIOS 301 Biochemistry I

Select one from:

- CHEM 211/CHEM 213 Organic Chemistry I and Organic Chemistry Discussion
- CHEM 319 Organic Chemistry I

CHEM 330 Analytical Chemistry
CHEM 360 Inorganic Chemistry

Select two 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 one from:

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

Select one 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 three 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 two from:

- BIOS 302 Biochemistry II
- CHEM 212 *or* CHEM 320 Organic Chemistry II
- Any lecture course between CHEM 400 and CHEM 489
- Any lecture course between CHEM 495 and CHEM 699

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

Chemistry BA

SAMPLE DEGREE PLAN

Sample degree plan without Chemistry AP credit.

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 330	Analytical Chemistry	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 368	Chemical Measurement 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
SENIOR		**15 credits**	**SENIOR**		**15 credits**
CHEM 4XX	Adv. Chemistry Lecture	3	CHEM 4XX	Advanced Chemistry Lecture	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
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 one from:	
CHEM 122/CHEM 124	General Chemistry II and Laboratory
CHEM 201/CHEM 205	Advanced Topics in General Chemistry and Laboratory
BIOS 301*	Biochemistry I
Select one from:	
CHEM 211/CHEM 213	Organic Chemistry I and Organic Chemistry Discussion
CHEM 319	Organic Chemistry I
CHEM 301/CHEM 302	Physical Chemistry I and 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 one from:	
PHYS 101/PHYS 103	Mechanics (with lab) and Mechanics Discussion
PHYS 111	Honors Mechanics (with Lab)
PHYS 125	General Physics (with Lab)
Select one 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 three 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 eight 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)

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

* CHEM 111/112/113/114 may substitute for CHEM 121/122/123/124
CHEM students may enroll in BIOS 301 without the prerequisite BIOS 201. Consult with the course instructor.
MATH 221/222 may substitute for MATH 212
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 - Requirements for specializations

Area of Specialization: Biological and Medicinal Chemistry

CHEM 212/CHEM 214 *or* CHEM 320	Organic Chemistry II and Organic Chemistry Discussion II *or* Organic Chemistry II
BIOS 302	Biochemistry II

Select two 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 two courses from:

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

Area of Specialization: Organic Chemistry

CHEM 212/CHEM 214 *or* CHEM 320	Organic Chemistry II and Organic Chemistry Discussion II *or* Organic Chemistry II
CHEM 401	Advanced Organic Chemistry

Select two courses from:

BIOS 302	Biochemistry II

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 430	Quantum Chemistry
CHEM 420	Classical and Statistical Thermodynamics

Select one course from:

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

Select one course (for at least three credit hours) from MATH or PHYS course offerings at the 400-level or above.

Chemistry BS

SAMPLE DEGREE PLAN

Sample degree plan without Chemistry AP credit.

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 330	Analytical Chemistry	3
CHEM 491	Research for Undergraduates	3	CHEM 368	Chemical Measurement Lab	2
DIST	Distribution Course	3	CHEM 491	Research for Undergraduates	3
OPEN	Open Elective	3	DIST	Distribution Course	3
SENIOR		**17 credits**	**SENIOR**		**14 credits**
CHEM 492	Undergraduate Honors Research	5	CHEM 493	Undergraduate Honors Research	5
CHEM 4XX	Advanced Chemistry Lecture	3	CHEM 4XX	Advanced Chemistry Lecture	3
CHEM 4XX	Advanced Chemistry Lecture	3	OPEN	Open Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

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

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

EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES

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

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

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

Degrees Offered

Earth, Environmental and Planetary Sciences	BS, BA, Minor

Frank Advice

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

Earth, Environmental and Planetary Sciences BA - Requirements

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

Select one course from the following:

ESCI 101/ENST 101	The Earth
ESCI 107	The Science of Climate Change
ESCI 108	Natural Disasters
ESCI 110	The Earth, Environment and Society
ESCI 111	Inhabiting Planet Earth
ESCI 115	Introduction to the Earth
ESCI 201/ENST 201	The Science of Climate Change

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

Select two to four courses from either Group A or Group B:

Group A

Select one from the following:

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

Group B

Select two from the following Option Catagories:

Option Category I

Select one from:

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

Option Category 2

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

Option Category 3

MATH 211	Ordinary Differential Equations and Linear Algebra

Option Category 4

CAAM 210	Introduction to Engineering Computation

Select four ESCI course offerings at the 300-level or above.

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

* CHEM 111/112/113/114 AP/OTH Credit in General Chemistry can substitute for CHEM 121/122/123/124.

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

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

FALL			SPRING		
FRESHMAN		**15 credits**	**FRESHMAN**		**17 credits**
ESCI 115	Introduction to the Earth	4	ESCI 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
SOPHOMORE		**13 credits**	**SOPHOMORE**		**16 credits**
ESCI 321	Earth System Evolution & Cycles	4	ESCI 325	Oceans, Atmospheres and Climate	4
ELECT	Elective Outside ESCI	3	ELECT	Elective Outside ESCI	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
ESCI 322	Earth Chemistry & Materials	4	ESCI 334	The Earth Laboratory	3
ESCI 300+	ESCI Lecture	3	ESCI 300+	ESCI Lecture	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
ESCI 300+	ESCI Lecture	3	ESCI 300+	ESCI 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
CAAM 210	Introduction to Engineering Computation
CHEM 121/123 *or* 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* 112/114	General Chemistry II and General Chemistry Lab II *or* AP/OTH credit in General Chem. II and General Chem. Lab II
Select one from:	
PHYS 101/103	Honors Mechanics (with lab) and Mechanics Discussion
PHYS 111	Honors Mechanics (with lab)
Select one from:	
PHYS 102/104	Electricity & Magnetism (with Lab) and E&M Discussion
PHYS 112	Honors Electricity and Magnetism (with Lab)
Select one course from:	
ESCI 101/ENST 101	The Earth
ESCI 107	The Science of Climate Change
ESCI 108	Natural Disasters
ESCI 110	The Earth System, Environment and Society
ESCI 111	Inhabiting Planet Earth
ESCI 115	Introduction to the Earth
ESCI 201/ENST 201	The Science of Climate Change
ESCI 321	Earth and Planetary Surface Environments
ESCI 322	Earth and Planetary Chemistry and Materials
ESCI 323	Earth and Planetary Structure and Dynamics
ESCI 325	Oceans, Atmospheres and Climate
ESCI 334	The Earth Laboratory

Students must complete one of the following areas of specialization.

Area of Specialization: Environmental Earth Science

Select at least one course from each of the following five fields (see 2020 GA for course lists):

Breadth in Environmental Science
Climate, Atmosphere, and Water
Environmental Geochemistry and Geophysics
Modeling and Computation
Surface Processes

continued

Earth, Environmental and Planetary Sciences BS - Requirements

Area of Specialization: Environmental Earth Science *continued*

Select a minimum of two courses from the following:

Any course from ESCI course offerings between course numbers ESCI 407:476, ESCI 495:499

ESCI 390 *or* ESCI 391	Geology Field Camp *or* Earth Science Field Experience
BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
CHEM 211/CHEM 213	Organic Chemistry I and Discussion
CHEM 212/CHEM 214	Organic Chemistry II and Discussion
MATH 212	Multivariable Calculus
PHYS 201	Waves, Light, and Heat
STAT 280	Elementary Applied 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 one course from each of the following four fields (see 2020 GA for course lists):

Deformation and Dynamics

Geophysics

Petrology, Geochemistry, and Materials Characterization

Surface Processes

Select a minimum of two courses from the following:

Any course from ESCI course offerings between course numbers ESCI 407:476, ESCI 495:499

ESCI 390 *or* ESCI 391	Geology Field Camp *or* Earth Science Field Experience
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
MATH 212	Multivariable Calculus
PHYS 201	Waves, Light, and Heat

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 one course from each of the following five fields (see 2020 GA for course lists):

Deformation and Dynamics

Modeling and Computation

Petrology, Geochemistry, and Materials Characterization

Solar System Workings

Surface Processes

Select a minimum of two courses from the following:

Any course from ESCI course offerings between course numbers ESCI 407:476, ESCI 495:499

ESCI 390 *or* ESCI 391	Geology Field Camp *or* Earth Science Field Experience
MATH 212	Multivariable Calculus
PHYS 201	Waves, Light, and Heat
PHYS 231	Elementary Physics Lab

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		
FRESHMAN		**15 credits**	**FRESHMAN**		**17 credits**
ESCI 115	Introduction to the Earth	4	ESCI 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
SOPHOMORE		**17 credits**	**SOPHOMORE**		**17 credits**
ESCI 321	Earth System Evolution & Cycles	4	ESCI 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
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		**17 credits**	**JUNIOR**		**15 credits**
ESCI 322	Earth Chemistry & Materials	4	ESCI 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	OPEN	Open Elective	3
JUNIOR SUMMER		**3 credits**			
ESCI 390 *or* 391	Geology Field Camp	3			
SENIOR		**16 credits**	**SENIOR**		**15 credits**
ELECT	Specialization	4	ELECT	Specialization	3
ELECT	Specialization	3	ELECT	Specialization	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Earth, Environmental and Planetary Sciences Minor - Requirements

Select one course from:

ESCI 101	The Earth
ESCI 107	The Science of Climate Change
ESCI 109	Oceanography
ESCI 110	The Earth System, Environment, and Society
ESCI 111	Inhabiting Planet Earth
ESCI 115	Introduction to the Earth
ESCI 201/ENST 201	The Science of Climate Change

Select two courses from:

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

Select three courses from ESCI course offerings at the 300-level or above.

ENVIRONMENTAL SCIENCE

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

The interdisciplinary Environmental Science BS and BA 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	BS, BA
Environmental Studies	Minor (through the School of Humanities)

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.
- The Environmental Studies minor provides a cross-disciplinary, holistic understanding of the challenges and solutions for creating a sustainable world. Open to undergraduates from a broad range of academic backgrounds, this minor provides foundational literacy in the social, cultural and scientific dimensions of environmental issues.

Environmental Science BA - Requirements

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
CHEM 121/122/123/124* *or* CHEM 111/112/113/114	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
BIOS 213	Introductory Lab in Ecology and Evolution
BIOS 332	Ecology
ENST 100/ARCH 105	Environment, Culture and Society

Any ESCI course offering at the 100-level

ESCI 321	Earth and Planetary Surface Environments
ESCI 325	Oceans, Atmospheres and Climate

One to two courses (2-3 credit hours) from the Field Experience list in the 2020 GA

One advanced Social Sciences elective from the list in the 2020 GA

One advanced Humanities and Architecture elective from the list in the 2020 GA

One advanced Natural Sciences and Engineering elective from the list in the 2020 GA

Students must complete the requirements for one major concentration.

Major Concentration: Earth Science

Select two courses from:

ESCI 321	Earth and Planetary Surface Environments
ESCI 322	Earth and Planetary Chemistry and Materials
ESCI 323	Earth and Planetary Structure and Dynamics
ESCI 340/ENST 340	Global Biogeochemical Cycles

Select at least one course from:

Any course from the ESCI course offerings at the 300-level (or above) designated as Lecture in the course catalog

ESCI 321	Earth and Planetary Surface Environments
ESCI 322	Earth and Planetary Chemistry and Materials
ESCI 323	Earth and Planetary Structure and Dynamics
ESCI 340/ENST 340	Global Biogeochemical Cycles
ESCI 380/FOTO 390	Visualizing Nature
ESCI 418/CEVE 418	Quantitative Hydrogeology
ESCI 421	Paleoceanography
ESCI 425/CHEM 425/ENST 425	Organic Geochemistry
ESCI 430	Trace-Element and Isotope Geochemistry for Earth and Environmental Science
ESCI 431	Geomorphology
ESCI 435	Mechanics of Sediment Transport
ESCI 452	GIS for Scientists and Engineers
ESCI 467	Geomechanics

* CHEM 151/152/153/154 may substitute for CHEM 121/122/123/124

Environmental Science BA - Requirements

Major Concentration: Ecology and Evolutionary Biology

Select two courses from:

BIOS 423	Conservation Biology
BIOS 373	Coral Reef Ecosystems

Select at least one 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
ESCI 340/ENST 340	Global Biogeochemical Cycles

Environmental Science BA

SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		**16 credits**	**FRESHMAN**		**14 credits**
BIOS 201	Introductory Biology I	3	BIOS 202	Introductory Biology II	3
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	1	CHEM 124	General Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing Intensive Seminar	3	DIST	Distribution Course	3
OPEN	Open Elective	3	LPAP	Lifetime Physical Activity Elective	1
SOPHOMORE		**14 credits**	**SOPHOMORE**		**16 credits**
BIOS 213	Intro Lab in Ecology & Evolutionary Biology	2	ESCI 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
ESCI 100-199	100-level ESCI course	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
ESCI 321	Earth and Planetary Surface Environments	4	FIELD	Field Experience	3
SOSCI	Social Sciences Elective	3	NSCI	Natural Sciences & Engineering Elective	3
HUMA	Humanities and Architecture Elective	3	CONC	Major Concentration	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
CONC	Major Concentration	3	CONC	Major Concentration	3
CONC	Major Concentration	3	CONC	Major Concentration	3
CONC	Major Concentration	3	OPEN	Open Elective	3
OPEN	Open Elective	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
CHEM 121/122/123/124* *or* CHEM 111/112/113/114	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 one from:

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

Select one from:

PHYS 102/104	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
BIOS 332	Ecology
ENST 100/ARCH 105	Environment, Culture and Society

Any ESCI course offering at the 100-level

ESCI 321	Earth and Planetary Surface Environments
ESCI 325	Oceans, Atmospheres and Climate

One to two courses (2-3 credit hours) from the Field Experience list in the 2020 GA

One advanced Social Sciences elective from the list in the 2020 GA

One advanced Humanities and Architecture elective from the list in the 2020 GA

One advanced Natural Sciences and Engineering elective from the list in the 2020 GA

One course (at least three credit hours) from:

BIOS 401	Undergraduate Honors Research
ESCI 390	Geology Field Camp
ESCI 391	Earth Science Field Experience
ESCI 481	Undergraduate Research in Earth Science

ESCI 495 Seminar: Topics in Environmental Science

* CHEM 151/152/153/154 may substitute for CHEM 121/122/123/124

Environmental Science BS - Requirements

Students must complete the requirements for one major concentration.

Major Concentration: Earth Science

Select two courses from:

ESCI 321	Earth and Planetary Surface Environments
ESCI 322	Earth and Planetary Chemistry and Materials
ESCI 323	Earth and Planetary Structure and Dynamics
ESCI 340/ENST 340	Global Biogeochemical Cycles

Select at least one course from:

Any course from the ESCI course offerings at the 300-level (or above) designated as Lecture in the course catalog

ESCI 321	Earth and Planetary Surface Environments
ESCI 322	Earth and Planetary Chemistry and Materials
ESCI 323	Earth and Planetary Structure and Dynamics
ESCI 340/ENST 340	Global Biogeochemical Cycles
ESCI 418/CEVE 418	Quantitative Hydrogeology
ESCI 421	Paleoceanography
ESCI 425/CHEM 425/ENST 425	Organic Geochemistry
ESCI 430	Trace-Element and Isotope Geochemistry for Earth and Environmental Science
ESCI 431	Geomorphology
ESCI 435	Mechanics of Sediment Transport
ESCI 452	GIS for Scientists and Engineers
ESCI 467	Geomechanics

Major Concentration: Ecology and Evolutionary Biology

Select two courses from:

BIOS 423	Conservation Biology
BIOS 373	Coral Reef Ecosystems

Select at least one 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
ESCI 340/ENST 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	ESCI 100-199	100-level ESCI 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**
ESCI 321	Earth and Planetary Surface Environments	4	ESCI 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	ESCI 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

Environmental Studies Minor - Requirements

ENST 100/ARCH 105	Environment, Culture and Society

Select one course from:

BIOS 124	Introduction to Ecology and Evolutionary Biology
ESCI 101/ENST 101	The Earth
ESCI 107	The Science of Climate Change
ESCI 109	Oceanography
ESCI 110	The Earth System, Environment, and Society
ESCI 111	Inhabiting Planet Earth

Select two courses from the Schools of Architecture, Humanities, and Social Sciences Elective Requirements list in the 2020 GA.

Select two courses from the Schools of Engineering and Natural Science Elective Requirements list in the 2020 GA.

KINESIOLOGY

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

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

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

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

- 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.
- Qualified students are encouraged to participate in independent research. This independent research allows integral involvement in basic or applied research directed by a faculty advisor. Opportunities are available with a variety of institutions in the Texas Medical Center as well as within the department.
- Students are encouraged to pursue any of a variety of highly competitive internships, which provide practical experience tailored to your interests. The close proximity of Rice to the Texas Medical Center allows you to find experience in a research or medical setting for potentially every aspect of health or medicine.

Health Sciences BA - 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 eight courses from:

ANTH 381	Medical Anthropology
ANTH 386	Medical Anthropology of Food and Health
ANTH 446	Advanced Topics in Biomedical Anthropology
BIOS 122	Biology for Voters
BIOS 201	Introductory Biology I
BIOE 360/ GLHT 360	Appropriate Design for Global Health
ECON 481	Health Economics
ENGL 272	Literature and Medicine
ENGL 273	Medicine and Media
ENST 315	Environmental Health
GLHT 201	Introduction to Global Health
HEAL 103	Nutrition
HEAL 119	Introduction to Health and Wellness
HEAL 132	Medical Terminology
HEAL 208	Chemical Alterations of Behavior
HEAL 212	Consumer Health and the Media
HEAL 306/SWGS 306	Human Sexuality
HEAL 350	Understanding Cancer
HEAL 360	Violence in America: A Public Health Perspective
HEAL 375	The Built Environment and Public Health
HEAL 379	Internship in Health Sciences
HEAL 380	Disparities in Health in America
HEAL 495	Independent Research in Health Sciences
HEAL 498	Special Topics in Health Sciences
KINE 300	Human Anatomy with Lab
KINE 301	Human Physiology
KINE 326	Exercise Epidemiology
KINE 440	Research Methods
MDHM 201	Introduction to Medical Humanities
PHIL 266	Medical Ethics
PHIL 354	Philosophy of Medicine
POLI 329	Health Policy
PSYC 345	Health Psychology
PSYC 346	Stress and Health Across the Lifespan
SOCI 313	Demography
SOCI 345	Medical Sociology
SOCI 465/SWGS 465	Gender and Health
SOSC 330	Health Care Reform in the 50 States

Health Sciences BA

SAMPLE DEGREE PLAN

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

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

Sports Medicine and Exercise Physiology BA - 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 five courses from:

BIOS 201	Introductory Biology I
BIOS 202	Introductory Biology II
BIOS 211	Intermediate Experimental Biosciences
BIOS 301	Biochemistry I
BIOS 302	Biochemistry II
BIOS 311	Advanced Experimental Biosciences
BIOS 313	Experimental Synthetic Biology
BIOS 372	Immunology
CHEM 121/CHEM 123 *or* CHEM 111/CHEM 113	General Chemistry I and General Chemistry Lab I *or* AP/OTH Credit
CHEM 122/CHEM 124 *or* CHEM 112/CHEM 114	General Chemistry II and General Chemistry Lab II *or* AP/OTH Credit
HEAL 132	Medical Terminology
HEAL 407	Epidemiology
KINE 120	Scientific Foundations of Kinesiology
KINE 326	Exercise Epidemiology
KINE 351	Advanced Human Anatomy Lab
KINE 375	Sports Medicine Internship
KINE 403	Sport Nutrition
KINE 410	Case Studies in Human Performance
KINE 412	Motor Control
KINE 415	Psychological Aspects of Sports Injury & Rehabilitation
KINE 419	Movement Disorders
KINE 421	Adv. Topics in Exercise Phys. & Preventive Medicine
KINE 430	Sports Injury: Evaluation, Management, & Treatment
KINE 495	Independent Research in Sports Medicine
KINE 498	Special Topics in Sports Medicine
KINE 499	Teaching Practicum in Sports Medicine
PHYS 101	Mechanics (with Lab)
PHYS 102	Electricity & Magnetism (with Lab)
PHYS 125	General Physics (with Lab)
PHYS 126	General Physics II (with Lab)
PSYC 202	Introduction to Social Psychology
PSYC 203	Introduction to Cognitive Psychology
PSYC 321	Developmental Psychology

* CHEM 151/152/153/154 may substitute for CHEM 121/122/123/124 or CHEM

Sports Medicine and ExercisePhysiology BA

SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		**15 credits**	**FRESHMAN**		**16 credits**
HEAL 103	Nutrition	3	ELECT	Kinesiology Elective	3
KINE 120	Foundations of Kinesiology (Elective)	3	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
SOPHOMORE		**16 credits**	**SOPHOMORE**		**15 credits**
KINE 300	Human Anatomy and Lab	4	KINE 301	Human Physiology	3
ELECT	Kinesiology Elective	3	ELECT	Kinesiology Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
KINE 302	Biomechanics	3	KINE 311	Motor Learning	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
SENIOR		**15 credits**	**SENIOR**		**15 credits**
ELECT	Kinesiology Elective	3	KINE 310	Psychological Aspects of Sport and Exercise	3
ELECT	Kinesiology Elective	3	ELECT	Kinesiology Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

MATHEMATICS

Mathematics is the study of structure that provides a language and tools for interpreting our world. The Mathematics Department offers training in the traditional areas of pure mathematics: analysis, algebra, geometry and topology, as well as courses in combinatorics, computational algebraic geometry and mathematical biology. Rice's Computational and Applied Mathematics (CAAM) and Statistics (STAT) departments offer an array of other mathematical courses. Undergraduates seeking a math degree are also trained in problem solving, analytical thinking and the logical and precise communication of their ideas. In the marketplace, law schools and business schools, it is precisely these skills that make math majors a valuable commodity.

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 extremely flexible; it allows students to design their own programs in conjunction with their advisors. This also makes math a popular double major. 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	BS, BA, Minor

MATHEMATICS

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. (www.ams.org/programs/students/students)
- 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 one from:

MATH 211 *and* MATH 212	Ordinary Differential Equations and Linear Algebra *and* Multivariable Calculus
MATH 211 *and* MATH 222	Ordinary Differential Equations and Linear Algebra *and* Honors Calculus IV
MATH 220 *and* MATH 212	Honors Ordinary Differential Equations *and* Multivariable Calculus
MATH 220 *and* MATH 222	Honors Ordinary Differential Equations *and* Honors Calculus IV
MATH 221 *and* MATH 222	Honors Calculus III *and* Honors Calculus IV

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

Mathematics BA

SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		**15 credits**	**FRESHMAN**		**16 credits**
MATH 101	Single Variable Calculus	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
DIST	Distribution Course	3	LPAP	Lifetime Physical Activity Elective	1
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
MATH 221	Honors Calculus III	3	MATH 222	Honors Calculus IV	3
DIST	Distribution Course	3	MATH 300+	Math Elective	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
MATH 354	Honors Linear Algebra	3	MATH 306 *or* 356	Elements of Abstract Algebra *or* Abstract Algebra I	3
MATH 300+	Math Elective	3	MATH 300+	Math Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
MATH 321 *or* 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 one 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 one course from:

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

Select one course from:

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

Select two courses from:

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

Select two courses from:

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

Select one course from:

MATH 370	Calculus on Manifolds
MATH 401	Differential Geometry of Curves and Surfaces
MATH 402	Differential Geometry

MATH 382 *or* MATH 427	Computational Complex Analysis *or* Complex Analysis

Select one course from:

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

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

Mathematics BS

SAMPLE DEGREE PLAN

This sample plan assumes AP credit.

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

FALL			SPRING		
FRESHMAN		**15 credits**	**FRESHMAN**		**16 credits**
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
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
MATH 321 *or* 331	Intro to Analysis I *or* Honors Analysis	3	MATH 322	Intro to Analysis II	3
MATH 354	Honors Linear Algebra	3	MATH 356	Abstract Algebra I	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
MATH 463	Abstract Algebra II	3	MATH 443	General Topology	3
DIST	Distribution Course	3	MATH 427	Complex Analysis	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
SENIOR		**15 credits**	**SENIOR**		**15 credits**
MATH 423	Partial Differential Equations I	3	MATH 402	Differential Geometry	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 one course 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 one course from:

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

Select one course from:

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

Select three additional courses from MATH course offerings.

NEUROSCIENCE

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 Texas Medical Center (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

Frank Advice

- Our website (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
CAAM 210	Introduction to Engineering Computation
CHEM 121/CHEM 123*	General Chemistry I and General Chemistry Lab I
or CHEM 111/CHEM 113	*or* AP/OTH Credit in General Chemistry I and General Chemistry Lab I
CHEM 122/CHEM 124*	General Chemistry II and General Chemistry Lab II
or CHEM 112/CHEM 114	*or* AP/OTH Credit in General Chemistry II and General Chemistry Lab 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
PHYS 125*	General Physics (with lab)
PHYS 126*	General Physics II (with lab)
PSYC 203	Introduction to Cognitive Psychology

Select one course from:

STAT 305	Introduction to Statistics for Biosciences
STAT 310/ECON 307	Probability and Statistics
STAT 312	Probability and Statistics for Engineers

NEUR 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 two courses (minimum of two 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 four courses (minimum of 12 credit hours) from:

BIOS 128*	Brainstem
BIOS 321	Animal Behavior
BIOS 442	Molecules, Memory and Model Animals: Methods in Behavioral Neuroscience
BIOS 443	Developmental Neurobiology
BIOS 449	Advanced Cell and Molecular Neuroscience
BIOE 492	Sensory Neuroengineering
COMP 440/ELEC 440	Artificial Intelligence
ELEC 475	Learning from Sensor Data
HIST 353	History of Sensation
NEUR 310*	Independent Research for Neuroscience Undergraduates

(continued)

Neuroscience BA - Requirements *continued*

NEUR 382/ELEC 382	Introduction to Computational Neuroscience
NEUR 411/ANTH 411/ LING 411	Neurolinguistics
NEUR 415/CAAM 415/ ELEC 488	Theoretical Neuroscience: From Cells to Learning Systems
NEUR 416/CAAM 416/ ELEC 489	Neural Computation
PHIL 130	The Sciences of the Mind
PHIL 231	Animal Minds
PHIL 330	Philosophy of Mind
PHIL 345	Theory of Knowledge
PHIL 431	Advanced Topics in the Sciences of the Mind
PSYC 310	Psychology of Aging
PSYC 354	Intro. to Social and Affective Neuroscience
PSYC 375	Neuropsychology of Language and Memory
PSYC 432	Brain and Behavior

* CHEM 151/152/153/154 may be substituted for CHEM 121/122/123/124
MATH 111 and MATH 112 may be substituted for MATH 101and MATH 102
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 129 (3 credit hours) 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

FRESHMAN		14 credits
BIOS 201	Intro Biology	3
CHEM 121	General Chemistry I	3
CHEM 123	General Chemistry Lab I	1
MATH 101	Single Variable Calculus I	3
BIOS 112	Intro Biological Research Challenges	1
FWIS	First Year Writing-Intensive Seminar	3

SOPHOMORE		15 credits
CAAM 210	Intro to Engineering Computation	3
BIOS 212	Intermediate Expl. Neuro.	2
PHYS 125	General Physics with Lab I	4
NEUR 385	Fundamentals of Neuroscience	3
OPEN	Open Elective	3

JUNIOR		16 credits
NEUR 385	Fund. Cellular/Molecular Neuro.	3
LAB	Required Lab	1
NEUR 383	Introduction to NeuroEngineering	3
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

SENIOR		18 credits
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

SPRING

FRESHMAN		14 credits
PSYC 203	Intro to Cognitive Science	3
CHEM 122	General Chemistry II	3
CHEM 124	General Chemistry Lab II	1
MATH 102	Single Variable Calculus II	3
LPAP	Lifetime Physical Act. Elective	1
OPEN	Open Elective	3

SOPHOMORE		17 credits
STAT 305	Intro to Stat for Biosciences	4
NEUR 380	Fund. Neuroscience Systems	3
PHYS 126	General Physics with Lab II	4
DIST	Distribution Course	3
OPEN	Open Elective	3

JUNIOR		16 credits
ELECT	Required Elective Course	3
NEUR 362	Cognitive Neuroscience	3
LAB	Required Lab	1
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

SENIOR		15 credits
ELECT	Required Elective Course	3
ELECT	Required Elective Course	3
DIST	Distribution Course	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 three courses (9 credit hours) from the Humanities and Social Science area of specialization list in the 2020 GA.

Select at least one course (three credit hours) from the Natural Science and Engineering area of specialization list in the 2020 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 three courses (9 credit hours) from the Natural Science and Engineering area of specialization list in the 2020 GA.

Select at least one course (three credit hours) from the Humanities and Social Science area of specialization list in the 2020 GA. NEUR 362/PSYC 362 may be used to fill this requirement.

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

PHYSICS AND ASTRONOMY

Students in the Department of Physics and Astronomy will acquire and demonstrate a solid foundation of knowledge in physics and/or astronomy and deeper knowledge of subdivisions of the field related to their interests. They will build the theoretical and laboratory skills necessary to succeed in graduate school or in the workplace and become leaders in their chosen discipline. Students will develop the ability to identify, formulate and solve challenging scientific and technical problems as encountered in physics and astronomy. They will acquire basic skills in reading the scientific literature and learn how to communicate scientific results orally and in writing with scientists and the general public.

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

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

Degrees Offered

Physics	BS, BA, minor
Astronomy	BA
Astrophysics	BS

PHYSICS AND ASTRONOMY

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 distributed to majors via email regularly.
- Not required but highly recommended: You should have some exposure to computer programming and numerical mathematics, at least at the level of CAAM 210.

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 one from:

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

Select one from:

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

PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 311	Introduction to Quantum Physics I

Select two 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 & Particle Physics
PHYS 416	Computational Physics
PHYS 425	Statistical and Thermal Physics
PHYS 480	Introduction to Plasma Physics

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

Select one course from:

CAAM 210	Introduction to Engineering Computation

One course from CAAM course offerings at the 300-level or above.

One course from MATH course offerings at the 300-level or above.

Physics BA

SAMPLE DEGREE PLAN

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

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

Physics BS - Requirements

MATH 101 *or* MATH 105	Single Variable Calculus I *or* AP/OTH credit in Calculus I
MATH 102 *or* MATH 106	Single Variable Calculus II *or* AP/OTH credit in Calculus II
MATH 211	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 one from:

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

Select one from:

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

PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 301	Intermediate Mechanics
PHYS 311	Introduction to Quantum Physics I
PHYS 491/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: Applied Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312 *or*	Introduction to Quantum Physics II *or*
ELEC 361	Quantum Mechanics for Engineers
PHYS 332	Junior Physics Lab II
ELEC 364	Photonics Measurements: Principles and Practice
PHYS 412	Solid State Physics (or approved substitute in applied physics)
PHYS 425	Statistical and Thermal Physics
ELEC 242 *and* ELEC 244	Signals, Systems, and Transforms *and* Analog Circuits
or ELEC 243	Laboratory *or* Electronic Measurement Systems
	or Electronic Measurement Systems
ELEC 305	Introduction to Physical Electronics
MATH 381 *or* CAAM 336	Introduction to Partial Differential Equations *or* Differential Equations in Science and Engineering

Major Concentration: 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: Biological Physics *continued*

BIOS 211	Intermediate Experimental Biosciences
BIOS 301 *or* BIOS 341	Biochemistry I *or* Cell Biology
CHEM 121/122/123/124*	General Chemistry I & II *and* General Chemistry Lab I & II
CHEM 211/CHEM 213	Organic Chemistry I and Organic Chemistry Discussion
MATH 381 *or* CAAM 336	Introduction to Partial Differential Equations *or* Differential Equations in Science and Engineering

* CHEM 111/112/113/114 *or* CHEM 151/152/153/154 may substitute for CHEM 121/122/123/124

Major Concentration: Computational Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312 *or* PHYS 425	Intro. to Quantum Physics II *or* Statistical and Thermal Physics
PHYS 416	Computational Physics
CAAM 210	Introduction to Engineering Computation
CAAM 334 *or* CAAM 335	Matrix Analysis for Data Science *or* Matrix Analysis
CAAM 336	Differential Equations in Science and Engineering
CAAM 453	Numerical Analysis I
COMP 130 *or* COMP 140	Elements of Algorithms and Computation *or* Computational Thinking

Select two 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 Diffential Equations
PHYS 580	Introduction to Plasma Physics

Major Concentration: 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 two 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 *or* CAAM 336	Introduction to Partial Differential Equations *or* Differential Equations in Science and Engineering
MATH 382 *or* CAAM 334 *or* CAAM 335	Computational Complex Analysis *or* Matrix Analysis for Data Science *or* 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		
FRESHMAN		**14 credits**	**FRESHMAN**		**16 credits**
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**16 credits**
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
DIST	Distribution Course	3	MATH 211	Differential Equations	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
PHYS 301	Intermediate Mechanics	4	PHYS 302	Intermediate Electrodynamics	4
PHYS 311	Intro to Quantum Physics I	3	PHYS 312	Intro to Quantum Physics II	3
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
SENIOR		**18 credits**	**SENIOR**		**15 credits**
PHYS 425	Statistical and Thermal Physics	3	PHYS 412	Solid State Physics	3
PHYS 411	Introduction to Nuclear and Particle Physics	3	PHYS 492	Undergraduate Research	2
PHYS 491	Undergraduate Research	2	PHYS 494	Undergraduate Research Seminar	1
PHYS 493	Undergraduate Research Seminar	1	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

Physics Minor - Requirements

Select one from:

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

Select one from:

PHYS 102 and PHYS 104	Electricity and Magnetism (with Lab) and Electricity and Magnetism Discussion
PHYS 112	Honors Electricity and Magnetism (with 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
MATH 211 *or* MATH 221	Ordinary Differential Equations and Linear Algebra *or* Honors Calculus III
MATH 212 *or* MATH 222	Multivariable Calculus *or* Honors Calculus IV
PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics

Select a minimum of three courses from PHYS course offerings at the 300-level or above.

Astronomy BA - 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

Select one from:

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

Select one from:

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

PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
ASTR 230	Astronomy Lab
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxy and Cosmo
ASTR 400	Undergraduate Research Seminar (two semesters required)

Select one from:

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

Astronomy BA

SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**16 credits**
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**16 credits**
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
COMP 140	Computational Thinking	3	MATH 211	Differential Equations	3
DIST	Distribution Course	3	ASTR 230	Astronomy Lab	3
OPEN	Open Elective	4	OPEN	Open Elective	3
			OPEN	Open Elective	3
JUNIOR		**14 credits**	**JUNIOR**		**14 credits**
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
ASTR 400	Undergraduate Research Seminar	1	ASTR 400	Undergraduate Research Seminar	1
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
ASTR 451	Astrophysics I - Sun and Stars	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
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

Select one from:

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

Select one from:

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

PHYS 201	Waves, Light, and Heat
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab
PHYS 301	Intermediate Mechanics
PHYS 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)

Select three courses from:

ASTR 408	Statistical Methods in Physics and Astronomy
ASTR 451	Astrophysics I: Sun and Stars
ASTR 452	Astrophysics II: Galaxies and Cosmology
ASTR 470	Solar System Physics
PHYS 312	Introduction to Quantum Physics II
PHYS 480	Introduction to Plasma Physics

Astrophysics BS

SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**16 credits**
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**16 credits**
PHYS 201	Waves, Light and Heat	3	PHYS 202	Modern Physics	3
MATH 212	Multivariable Calculus	3	PHYS 231	Elementary Physics Lab	1
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		**17 credits**	**JUNIOR**		**17 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	ASTR 400	Undergraduate Research Seminar	1
ASTR 400	Undergraduate Research Seminar	1	PHYS 312	Intro to Quantum Physics II	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**18 credits**	**SENIOR**		**15 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	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

DEGREE REQUIREMENTS

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 higher).
- 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).
- 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

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 three courses of designated distribution courses of at least three credit hours each in each of Distribution Groups I, II, and III.** The three 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*.

Dual-Degree Requirements
To earn a second four-year bachelor's degree, also known as a dual degree, currently enrolled undergraduates who have not yet completed their first bachelor's degree must:

- be accepted for the second major by the major's department or program
- fulfill all requirements for the second degree
- complete at least 30 additional semester hours at Rice University, beyond the hours required for their first degree (these hours are applied to the second degree)

MAJOR ADVISORS

BIOSCIENCES

Prospectives, Freshmen and Undeclared Sophomores

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

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Major concentrations: Ecology and Evolutionary Biology, Integrative Biology

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Declared Majors and Minors

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Minor: Biochemistry and Cell Biology

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Minor: Ecology and Evolutionary Biology

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EARTH, ENVIRONMENTAL AND PLANETARY SCIENCES

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Geoscience and Environmental Earth Concentrations

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Transfer credit

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PHYSICS AND ASTRONOMY

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Stan Dodds	dodds@rice.edu	(Physics)