

# NATURAL SCIENCES

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## New Student Advising Fall 2016

Welcome to the Rice University Class of 2020!

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.**





# Contents

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## GENERAL ADVICE

- 4 Advisors
- 5 AP Credit
- 6 Degree Planning
- 7 Choosing a BA or BS Degree
- 8 Research
- 10 Pre-Health Professions
- 11 Study Abroad

## DEPARTMENTS & PROGRAMS

- 12 Introduction
- 13 Biosciences
- 28 Chemistry
- 36 Earth Science
- 44 Environmental Studies
- 50 Global Health Technologies
- 52 Kinesiology
- 58 Mathematics
- 64 Neuroscience
- 66 Physics and Astronomy

## REFERENCE INFORMATION

- 78 Degree Requirements
- 80 Major Advisors

# Advisors

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As an incoming freshman at Rice, you have many advisors available to you. Your College Master 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.

# AP Credit

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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

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

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

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

# Choosing a BA or BS Degree

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

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

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

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

# Research

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Participation in 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 research with Rice faculty and with our partners at the Texas Medical Center. You are encouraged to begin research as early as possible and 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 Natural Sciences Undergraduate Research Showcase and the Rice Undergraduate Research Symposium (held each spring) to see student research poster presentations. Also, look at the posters in the hallways on your way to or from class or lab.



# Research

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## **Contacting a Potential Advisor**

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

# Pre-Health Professions

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

The Office of Academic Advising 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, the Health Professions Advising Orientation will be offered on Wednesday, August 24, from 6-7 PM in the Grand Hall.

Consider taking a course designed to help you determine if medical school is the right fit for you. **NSCI 399: Medical Professionalism and Observership (MPRO)** consists of lectures to enhance knowledge of medical professionalism, an intense writing experience aimed at reflecting on experiences in both the lectures and clinical settings, and an opportunity to shadow a physician and/or observe in the operating room, intensive care unit or other clinical unit at Houston Methodist hospital.

# Study Abroad

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

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

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

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

# Departments and Programs

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

## **Sample Degree Plans**

The provided degree summaries and sample degree plans 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.

The sample degree plan is only one of many possible schedules. Consult with your advising team to develop a personalized degree plan that takes into account your background and interests.

- 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.
- All sample degree plans assume that the FWIS will fulfill a Group I or Group II Distribution credit.

# Biosciences

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Faculty members in the Department of Biosciences have a deep commitment to students even as they pursue their own research programs. They share a love of the natural world that inspires their teaching and mentorship. Students at all levels engage in research in Biosciences laboratories, and many undergraduates publish work in top journals. The multiple major degree paths offered by the department will prepare you for graduate, medical, or other professional schools and a surprisingly wide range of careers in the life sciences.

The **Biochemistry and Cell Biology (BIOC)** program emphasizes a broad understanding of cell biology and biochemistry and provides room for exploration across Natural Sciences or Engineering. BIOC students are strongly encouraged to pursue their research interests through independent research experiences at Rice or other Houston-area institutions. The BIOC minor incorporates many of the life science core courses required for the health professions and is intended for those with an interest in the life sciences who may be majoring in other areas.

The **Ecology and Evolutionary Biology (EBIO)** program addresses important ecological and evolutionary questions with collaborative research initiatives and innovative ecological, evolutionary, and genomic tools. The coursework emphasizes a broad understanding of basic biology together with in-depth knowledge of ecology and evolutionary biology. Students pursuing a BS in EBIO are required to conduct independent research under the supervision or co-supervision of an EBIO faculty member, though the research can take place in other locations or institutions such as the Texas Medical Center or at field sites throughout the world. The EBIO minor is intended for those with an interest in the life sciences who are majoring in other areas.

The **Biological Sciences degree incorporates elements of the EBIO and BIOC** programs to give students a broad understanding of the full range of biological disciplines. Although Biological Sciences majors must distribute their upper-level electives between the two programs, they have few restrictions on which upper-level Biosciences courses they select. This flexibility gives Biological Sciences students the opportunity to design a path that suits their specific interests.

# Biosciences

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## Degrees Offered

Biochemistry and Cell Biology (BIOC)	BS, BA, Minor
Ecology and Evolutionary Biology (EBIO)	BS, BA, Minor
Biological Sciences*	BA

*\*As the Biological Sciences BA combines coursework from both BIOC and EBIO programs, this major may not be combined with any other Biosciences degree.*

## Frank Advice

- Take the BIOC prelab exam to prequalify for the BIOC lab sequence (lab exam and registration instructions can be found at: [www.clear.rice.edu/bioc111](http://www.clear.rice.edu/bioc111)).
- Those without biology AP credit should enroll in BIOC 201, which is a prerequisite for virtually all other biological sciences courses. EBIO 202 is a requirement for those majoring in Biological Sciences and EBIO.
- If you have AP credit and feel confident in your biology background, take BIOC 300 in the fall semester. This course is a transition to the upper level BIOC courses and counts toward a 300-level BIOC requirement if taken before any other 300-level BIOC course.
- Research opportunities for undergraduates are available in most Bioscience labs.
  - BIOC students should visit the BIOC 310 course website ([www.bioc.rice.edu/bioc310/](http://www.bioc.rice.edu/bioc310/)) for more information and listings of opportunities.
  - EBIO students are encouraged to get involved in research as early as possible. Applications for conducting senior research, required for the BS, are due at the end of the Spring semester one year prior to your anticipated graduation date.

# Biosciences

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- Not required but highly recommended courses:
  - BIOC 115/EBIO 116 – Freshman Seminar in Local Biology Research
  - BIOC 300 – Paradigms in Biochemistry and Cell Biology
  - BIOC 310/EBIO 306 – Independent Research for Undergraduates
  - EBIO 270 – Ecosystem Management
- Highly qualified students may apply to the Biochemistry & 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.

## Biochemistry and Cell Biology BA - Requirements

MATH 101/102*	Single Variable Calculus I and II
MATH 211	Ordinary Differential Equations
PHYS 125/126*	General Physics I and II
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	Organic Chemistry Lab

BIOC 201	Introductory Biology
BIOC 301	Biochemistry I
BIOC 341	Cell Biology

*Two courses from:*

BIOC 302	Biochemistry II
BIOC 344	Molecular Biology and Genetics
BIOC 352*	Physical Chemistry for the Biosciences

BIOC 211	Intermediate Experimental Biosciences
BIOC 311	Advanced Experimental Biosciences

*Two courses from:*

BIOC 313	Introductory Synthetic Biology
BIOC 318	Laboratory in Applied Microbiology
BIOC 320/BIOE342	Laboratory in Tissue Culture
BIOC 413	Experimental Molecular Biology
BIOC 415	Experimental Physiology
BIOC 530	NMR Spectroscopy and Molecular Modeling
BIOC 532	Laboratory Module in Optical Spectroscopy
BIOC 533	Bioinformatics and Computational Biology
BIOC 535	Practical X-Ray Crystallography

One independent research experience:

BIOC 310 (if at least 3 credits)
HONS 470/471
BIOC 401/402/412

One BIOC 400-level course

Two NSCI or ENGR 300-level or higher courses

\* MATH 111/112 may substitute for MATH 101

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

PHYS 101/102/103/104 or PHYS 111/112 may substitute for PHYS 125/126

CHEM 310 or CHEM 311/312 may substitute for BIOC 352



## Biochemistry and Cell Biology BA

### SAMPLE DEGREE PLAN

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

#### FALL

#### SPRING

FRESHMAN			FRESHMAN		
15 credits			16 credits		
BIOC 201	Intro Biology I	3	BIOC 211	Intermediate Experimental Biosciences	2
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
BIOC 111	Lab Fundamentals (or pass out)	1	DIST	Distribution Course	3
BIOC 115	Freshman Seminar in Local Biology Research	1	OPEN	Open Elective (BIOC 300)	3

  

SOPHOMORE			SOPHOMORE		
16 credits			15 credits		
NSCI/ENG	300+ level Elective	3	BIOC 344	Molecular Biology & Genetics	3
PHYS 125	General Physics I	4	PHYS 126	General Physics II	4
CHEM 211	Organic Chemistry I	3	CHEM 212	Organic Chemistry II	3
CHEM 213	Organic Chemistry Discussion I	0	CHEM 214	Organic Chemistry Discussion II	0
MATH 211	Differential Equations	3	CHEM 215	Organic Chemistry Lab	2
DIST	Distribution Course	3	DIST	Distribution Course	3

  

JUNIOR			JUNIOR		
15 credits			17 credits		
BIOC 301	Biochemistry I	3	BIOC 302	Biochemistry II	3
BIOC 310	Independent Research (Advanced Lab)	3	NSCI/ENG	300+ level Elective	3
DIST	Distribution Course	3	BIOC 311	Advanced Experimental Biosciences	2
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective (BIOC 310)	3

  

SENIOR			SENIOR		
16 credits			15 credits		
BIOC 341	Cell Biology	3	BIOC 4xx	400-level Elective	3
BIOC Lab 300+	Advanced Lab	1	OPEN	Open Elective (BIOC 310)	3
OPEN	Open Elective (BIOC 310)	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			

## Biochemistry and Cell Biology BS - Requirements

MATH 101/102*	Single Variable Calculus I and II
MATH 211	Ordinary Differential Equations
PHYS 125/126*	General Physics I and II
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	Organic Chemistry Lab
BIOC 201	Introductory Biology
BIOC 301	Biochemistry I
BIOC 341	Cell Biology
BIOC 302	Biochemistry II
BIOC 344	Molecular Biology and Genetics
BIOC 352*	Physical Chemistry for the Biosciences
BIOC 211	Intermediate Experimental Biosciences
BIOC 311	Advanced Experimental Biosciences

*Two courses from:*

BIOC 313	Introduction to Synthetic Biology
BIOC 318	Laboratory in Applied Microbiology
BIOC 320/BIOE342	Laboratory in Tissue Culture
BIOC 413	Experimental Molecular Biology
BIOC 415	Experimental Physiology
BIOC 530	NMR Spectroscopy and Molecular Modeling
BIOC 532	Laboratory Module in Optical Spectroscopy
BIOC 533	Bioinformatics and Computational Biology
BIOC 535	Practical X-Ray Crystallography

One independent research experience:

- BIOC 310 (if at least 3 credits)
- HONS 470/471
- BIOC 401/402/412

Two BIOC 400-level courses

Two NSCI or ENGR 300-level or higher courses

\* MATH 111/112 may substitute for MATH 101

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

PHYS 101/102/103/104 or PHYS 111/112 may substitute for PHYS 125/126

CHEM 310 or CHEM 311/312 may substitute for BIOC 352

## Biochemistry and Cell Biology BS

### SAMPLE DEGREE PLAN

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

#### FALL

#### SPRING

FRESHMAN			FRESHMAN		
15 credits			16 credits		
BIOC 201	Intro Biology I	3	BIOC 211	Intermediate Experimental Biosciences	2
CHEM 121	General Chemistry I	1	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Lab I	3	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
BIOC 111	Lab Fundamentals (or pass out)	1	DIST	Distribution Course	3
BIOC115	Freshman Seminar in Local Biology Research	1	OPEN	Open Elective (BIOC 300)	3

SOPHOMORE			SOPHOMORE		
16 credits			18 credits		
NSCI/ENG	300+ Elective	3	BIOC 344	Molecular Biology & Genetics	3
PHYS 125	General Physics I	4	PHYS 126	General Physics II	4
CHEM 211	Organic Chemistry I	3	CHEM 212	Organic Chemistry II	3
CHEM 213	Organic Chemistry Discussion I	0	CHEM 214	Organic Chemistry Discussion II	0
MATH 211	Differential Equations	3	CHEM 215	Organic Chemistry Lab	2
DIST	Distribution Course	3	DIST	Distribution Course	3
			DIST	Distribution Course	3

JUNIOR			JUNIOR		
17 credits			18 credits		
BIOC 301	Biochemistry I	3	BIOC 302	Biochemistry II	3
NSCI/ENG	300+ Elective	3	BIOC 341	Cell Biology	3
BIOC 311	Advanced Experimental Biosciences	2	DIST	Distribution Course	3
BIOC 310	Independent Research (Advanced Lab)	3	OPEN	Open Elective (BIOC 310)	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

SENIOR			SENIOR		
18 credits			15 credits		
BIOC 4xx	400-level Elective	3	BIOC 4xx	400-level Elective	3
BIOC 352	Physical Chemistry for Biosciences	3	DIST	Distribution Course	3
BIOC Lab 300+	Advanced Lab	3	OPEN	Open Elective (BIOC 310)	3
OPEN	Open Elective (BIOC 310)	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

## Biochemistry and Cell Biology Minor - Requirements

MATH 101/102*	Single Variable Calculus I and II
PHYS 125/126*	General Physics I and II
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	Organic Chemistry Lab
BIOC 201	Introductory Biology
BIOC 211	Intermediate Experimental Biosciences
BIOC 301	Biochemistry
BIOC 341	Cell Biology

One BIOC lecture course at the 300-level or above

\* MATH 111/112 may substitute for MATH 101

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

PHYS 101/102/103/104 or PHYS 111/112 may substitute for PHYS 125/126

## Ecology and Evolutionary Biology BA - Requirements

MATH 101/102*	Single Variable Calculus I and II
EBIO 338 <i>or</i> STAT course	Design and Analysis of Biological Experiments
CHEM 121/123*	General Chemistry I and General Chemistry Lab I
PHYS 125*	General Physics I
BIOC 201	Introductory Biology I
EBIO 202	Introductory Biology II
EBIO 325	Ecology
EBIO 334/BIOC 334	Evolution
BIOC 211	Intermediate Experimental Biosciences
EBIO 213	Introductory Lab in Ecology and Evolutionary Biology
EBIO 412	Advanced Communication in the Biosciences

Two lecture courses in Ecology and Evolutionary Biology from the list in the 2016 General Announcements

One lecture course in Biochemistry and Cell Biology from the list in the 2016 General Announcements

One EBIO laboratory course from the list in the 2016 General Announcements

One BIOC laboratory course from the list in the 2016 General Announcements

One NSCI or ENGR course (3 credit hours) at the 300-level or above

\* MATH 111/112 may substitute for MATH 101

CHEM 151/153 may substitute for CHEM 121/123

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

## Ecology and Evolutionary Biology BA

### SAMPLE DEGREE PLAN

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

#### FALL

#### SPRING

FRESHMAN			FRESHMAN		
16 credits			15 credits		
BIOC 201	Intro Biology I	3	EBIO 202	Intro Biology II	3
CHEM 121	General Chemistry I	3	EBIO 213	Intro Lab in EEB	2
CHEM 123	General Chemistry Lab I	1	MATH 102	Single Variable Calculus II	3
MATH 101	Single Variable Calculus I	3	DIST	Distribution Course	3
BIOC 211	Intro Experimental Biosciences	2	LPAP	Lifetime Physical Activity Elective	1
FWIS	First Year Writing-Intensive Seminar	3	OPEN	Open Elective	3
EBIO 116	Freshman Seminar on Local Biology Research	1			

  

SOPHOMORE			SOPHOMORE		
17 credits			16 credits		
PHYS 125	General Physics I	4	EBIO 334	Evolution	3
EBIO Lab	EBIO Laboratory	1	EBIO 300+	EBIO Lecture	3
STAT 305	Intro to Statistics for Biosciences	3	BIOC Lab	BIOC Laboratory	1
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

  

JUNIOR			JUNIOR		
15 credits			15 credits		
EBIO 325	Ecology	3	EBIO 300+	EBIO Lecture	3
BIOC 300+	BIOC 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	OPEN	Open Elective	3

  

SENIOR			SENIOR		
15 credits			15 credits		
EBIO 412	Advanced Communication in the Biosciences	3	NSCI/ENG	300+ level 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	OPEN	Open Elective	3

## Ecology and Evolutionary Biology BS - Requirements

MATH 101/102*	Single Variable Calculus I and II
EBIO 338 <i>or</i> STAT course	Design and Analysis of Biological Experiments
CHEM 121/123*	General Chemistry I and General Chemistry Lab I
PHYS 125*	General Physics I
BIOC 201	Introductory Biology I
EBIO 202	Introductory Biology II
EBIO 325	Ecology
EBIO 334/BIOC 334	Evolution
BIOC 211	Intermediate Experimental Biosciences
EBIO 213	Introductory Lab in Ecology and Evolutionary Biology
EBIO 412	Advanced Communication in the Biosciences
EBIO 306	Independent Research (at least 2 credit hours)
EBIO 403/404	Senior Research

Two lecture courses in Ecology and Evolutionary Biology from the list in the 2016 General Announcements

One lecture course in Biochemistry and Cell Biology from the list in the 2016 General Announcements

One EBIO laboratory course from the list in the 2016 General Announcements

One BIOC laboratory course from the list in the 2016 General Announcements

One NSCI or ENGR course (3 credit hours) at the 300-level or above

\* MATH 111/112 may substitute for MATH 101

CHEM 151/153 may substitute for CHEM 121/123

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

## Ecology and Evolutionary Biology BS

### SAMPLE DEGREE PLAN

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

#### FALL

FRESHMAN		16 credits
BIOC 201	Intro Biology I	3
CHEM 121	General Chemistry I	3
CHEM 123	General Chemistry Lab I	1
MATH 101	Single Variable Calculus I	3
BIOC 211	Intro Experimental Biosciences	2
FWIS	First Year Writing-Intensive Seminar	3
EBIO 116	Freshman Seminar on Local Biology Research	1

#### SPRING

FRESHMAN		15 credits
EBIO 202	Intro Biology II	3
EBIO 213	Intro Lab in EEB	2
MATH 102	Single Variable Calculus II	3
DIST	Distribution Course	3
OPEN	Open Elective	3
LPAP	Lifetime Physical Activity Elective	1

#### SOPHOMORE

17 credits

PHYS 125	General Physics I	4
EBIO Lab	EBIO Laboratory	1
STAT 305	Intro to Statistics for Biosciences	3
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

#### SOPHOMORE

16 credits

EBIO 334	Evolution	3
EBIO 300+	EBIO Lecture	3
BIOC Lab	BIOC Laboratory	1
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

#### JUNIOR

14 credits

EBIO 325	Ecology	3
BIOC 300+	BIOC Lecture	3
NSCI/ENG	300+ level Elective	3
EBIO 306	Independent Research	2
DIST	Distribution Course	3

#### JUNIOR

14 credits

EBIO 300+	EBIO Lecture	3
EBIO 306	Independent Research	2
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

#### SENIOR

16 credits

EBIO 403	Senior Research	5
EBIO 412	Advanced Communication in the Biosciences	2
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3

#### SENIOR

14 credits

EBIO 404	Senior Research	5
DIST	Distribution Course	3
OPEN	Open Elective	3
OPEN	Open Elective	3



## Ecology and Evolutionary Biology Minor - Requirements

BIOC 201

Introductory Biology

EBIO 202

Introductory Biology II

EBIO 213

Introductory Lab in Ecology and Evolutionary Biology

Four lecture courses from the list in the 2016 General Announcements

## Biological Sciences BA - Requirements

MATH 101/102*	Single Variable Calculus I and II
MATH 211 or STAT 305 or EBIO 338	Differential Equations or Biological Statistics or Design and Analysis of Biological Experiments
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	Organic Chemistry Lab
PHYS 125/126*	General Physics I and II

BIOC 201	Introductory Biology
EBIO 202	Introductory Biology II

BIOC 211	Intermediate Experimental Biosciences
EBIO 213	Introductory Lab in Ecology and Evolutionary Biology

Three advanced biology lab courses from the list in the 2016 General Announcements

BIOC 301	Biochemistry
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One course from:

BIOC 302	Biochemistry II
BIOC 341	Cell Biology
BIOC 344	Molecular Biology and Genetics
BIOC 352*	Physical Chemistry for the Biosciences

Three or four EBIO lecture courses from the list in the 2016 General Announcements.

*If you choose to complete three EBIO lecture courses, you are required to complete two BIOC lecture courses.*

One or two BIOC lecture courses from the list in the 2016 General Announcements.

*If you choose to complete one BIOC lecture course, you are required to complete four EBIO lecture courses.*

\* 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

CHEM 365 may substitute for CHEM 215

PHYS 101/102/103/104 or PHYS 111/112 may substitute for PHYS 125/126

CHEM 310 or CHEM 311/312 may substitute for BIOC 352

A maximum of 3 credits of BIO 390 and 3 credits of EBIO 391 can apply to this major.

Biological Sciences BA

**SAMPLE DEGREE PLAN**

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

**FALL**

**SPRING**

<b>FRESHMAN</b>			<b>FRESHMAN</b>		
<b>16 credits</b>			<b>16 credits</b>		
BIOC 201	Intro Biology I	3	EBIO 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
EBIO 213	Intro Lab in EEB	2	BIOC 211	Intermediate Experimental Biosciences	2
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
BIOC 111	Lab Fundamentals (or pass out)	1	LPAP	Lifetime Physical Activity Elective	1

<b>SOPHOMORE</b>			<b>SOPHOMORE</b>		
<b>16 credits</b>			<b>15 credits</b>		
EBIO 300+	EBIO Lecture	3	EBIO 300+	EBIO Lecture	3
PHYS 125	General Physics I	4	PHYS 126	General Physics II	4
CHEM 211	Organic Chemistry I	3	CHEM 212	Organic Chemistry II	3
CHEM 213	Organic Chemistry Discussion I	0	CHEM 214	Organic Chemistry Discussion II	0
MATH 211	Differential Equations	3	CHEM 215	Organic Chemistry Lab	2
DIST	Distribution Course	3	DIST	Distribution Course	3

<b>JUNIOR</b>			<b>JUNIOR</b>		
<b>16 credits</b>			<b>16 credits</b>		
BIOC 301	Biochemistry I	3	BIOC CORE	BIOC 302, 341, 344, or 352	3
EBIO 300+	EBIO Lecture	3	BIOC/EBIO Lab	Advanced Lab	1
BIOC/EBIO Lab	Advanced Lab	1	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective (BIOC 310)	3
OPEN	Open Elective	3	OPEN	Open Elective	3

<b>SENIOR</b>			<b>SENIOR</b>		
<b>16 credits</b>			<b>16 credits</b>		
BIOC/EBIO 300+	BIOC or EBIO Lecture	3	BIOC 300+	BIOC Lecture	3
BIOC/EBIO Lab	Advanced Lab	1	DIST	Distribution Course	3
OPEN	Open Elective (BIOC 310)	3	OPEN	Open Elective (BIOC 310)	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	1

# Chemistry

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

The BS program rigorously prepares students for Ph.D. 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 on 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.

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

Chemistry	BS, BA
Chemical Physics	BS

# Chemistry

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## 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. 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).
- 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 should complete three semesters of research, each with three or more credits. Seniors planning to pursue a Ph.D. 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 151/152/153/154\*      Honors Chemistry I and II and Honors Chemistry Lab I and II

CHEM 211/213      Organic Chemistry I and Organic Chemistry Discussion

CHEM 330      Analytical Chemistry

CHEM 360      Inorganic Chemistry

BIOC 301      Biochemistry I

*Two courses from:*

CHEM 311      Physical Chemistry I

CHEM 312      Physical Chemistry II

BIOC 352      Physical Chemistry for the Biosciences

MATH 101/102      Single Variable Calculus I and II

MATH 212\*      Multivariable Calculus

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

PHYS 102/104 or 112 or 126      Electricity & Magnetism (with lab) and E & M Discussion or Electricity & Magnetism (with lab) or General Physics II (with lab)

*Three courses from:*

CHEM 365      Organic Chemistry Laboratory

CHEM 366      Inorganic Chemistry Laboratory

CHEM 367      Materials Chemistry Laboratory

CHEM 368      Chemical Measurement Laboratory

BIOC 311      Advanced Experimental Biosciences

*Two courses (six credit hours) from advanced chemistry work:*

400-level courses or above

CHEM 212      Organic Chemistry II

CHEM 320      Organic Chemistry II

BIOC 302      Biochemistry II

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

MATH 221/222 may substitute for MATH 212

## Chemistry BA

### SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		17 credits	FRESHMAN		15 credits
CHEM 151	Honors Chemistry I	3	CHEM 152	Honors Chemistry II	3
CHEM 153	Honors Chemistry Lab I	1	CHEM 154	Honors Chemistry Lab II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
DIST	Distribution Course	3	DIST	Distribution Course	3
SOPHOMORE		15 credits	SOPHOMORE		14 credits
CHEM 211	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
CHEM 213	Organic Chemistry Discussion	0	CHEM 360	Inorganic Chemistry	3
MATH 212	Multivariable Calculus	3	CHEM 365	Organic Chemistry Lab	2
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		17 credits	JUNIOR		14 credits
CHEM 311	Physical Chemistry I	3	CHEM 312	Physical Chemistry II	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 330	Analytical Chemistry	3
DIST	Distribution Course	3	CHEM 368	Chemical Measurement Lab	2
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
SENIOR		15 credits	SENIOR		15 credits
BIOC 301	Biochemistry I	3	CHEM 4xx	400-level 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
OPEN	Open Elective	3	OPEN	Open Elective	3

## Chemistry BS - Requirements

CHEM 151/152/153/154*	Honors Chemistry I and II and Honors Chemistry Lab I and II
CHEM 211/213	Organic Chemistry I and Organic Chemistry Discussion
CHEM 311/312	Physical Chemistry I and II
CHEM 330	Analytical Chemistry
CHEM 360	Inorganic Chemistry
BIOC 301	Biochemistry I
MATH 101/102	Single Variable Calculus I and II
MATH 212*	Multivariable Calculus
PHYS 101/103 or 111 or 125	Mechanics (with lab) and Mechanics Discussion or Mechanics (with lab) or General Physics (with lab)
PHYS 102/104 or 112 or 126	Electricity & Magnetism (with lab) and E & M Discussion or Electricity & Magnetism (with lab) or General Physics II (with lab)

Three courses from:

CHEM 365	Organic Chemistry Laboratory
CHEM 366	Inorganic Chemistry Laboratory
CHEM 367	Materials Chemistry Laboratory
CHEM 368	Chemical Measurement Laboratory
BIOC 311	Advanced Experimental Biosciences

Eight credit hours of research from the list in the 2016 General Announcements.

CHEM 391 must be for at least three credit hours.

Each student must complete the requirements for one specialization.

### Specialization in Biological and Medicinal Chemistry

CHEM 212/214 or CHEM 320	Organic Chemistry II and Organic Chemistry Discussion or Organic Chemistry II
BIOC 302	Biochemistry II
Six credit hours of advanced coursework in chemistry	

### Specialization in Inorganic Chemistry and Inorganic Materials

CHEM 475	Physical Methods in Inorganic Chemistry
CHEM 495	Transition Metal Chemistry
Six credit hours of advanced coursework in chemistry	

### Specialization in Organic Chemistry

CHEM 212/214 or CHEM 320	Organic Chemistry II and Organic Chemistry Discussion or Organic Chemistry II
CHEM 401	Advanced Organic Chemistry
Six credit hours of advanced coursework in chemistry	

### Specialization in Physical and Theoretical Chemistry

CHEM 430	Quantum Chemistry
CHEM 420	Classical and Statistical Thermodynamics
CHEM 415 or 450 or 531 or 559	advanced course in physical chemistry
One course (three credit hours) MATH or PHYS at 400-level or above	

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

MATH 221/222 may substitute for MATH 212



Chemistry BS

**SAMPLE DEGREE PLAN**

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

FALL			SPRING		
FRESHMAN		15 credits	FRESHMAN		15 credits
CHEM 151	Honors Chemistry I	3	CHEM 152	Honors Chemistry II	3
CHEM 153	Honors Chemistry Lab I	1	CHEM 154	Honors Chemistry Lab II	1
CHEM 110	Freshman Chemistry Seminar	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	E & M Discussion	0
PHYS 103	Mechanics Discussion	0	LPAP	Lifetime Physical Activity Elective	1
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
SOPHOMORE		16 credits	SOPHOMORE		17 credits
CHEM 211	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
CHEM 213	Organic Chemistry Discussion	0	CHEM 360	Inorganic Chemistry	3
CHEM 220	Undergraduate Chemistry Seminar	1	CHEM 365	Organic Chemistry Lab	2
MATH 212	Multivariable Calculus	3	CHEM 391	Research for Undergraduates	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
JUNIOR		17 credits	JUNIOR		17 credits
BIOC 301	Biochemistry I	3	CHEM 312	Physical Chemistry II	3
CHEM 311	Physical Chemistry I	3	CHEM 330	Analytical Chemistry	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 368	Chemical Measurement Lab	2
CHEM 491	Research for Undergraduates	3	CHEM 491	Research for Undergraduates	3
DIST	Distribution Course	3	ELECT	Specialization	3
OPEN	Open Elective	3	DIST	Distribution Course	3
SENIOR		17 credits	SENIOR		17 credits
CHEM 492	Undergraduate Honors Research	5	CHEM 493	Undergraduate Honors Research	5
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

## Chemical Physics BS - Requirements

CHEM 121/122/123/124*	General Chemistry I and II and General Chemistry Lab I and II
CHEM 211/213	Organic Chemistry I and Organic Chemistry Discussion
CHEM 215	Organic Chemistry Lab
CHEM 311	Physical Chemistry I
CHEM 312	Physical Chemistry II

PHYS 101/103 <i>or</i> PHYS 111	Mechanics (with lab) and Mechanics Discussion <i>or</i> Mechanics (with lab)
PHYS 102/104 <i>or</i> PHYS 112	Electricity & Magnetism (with lab) and E&M Discussion <i>or</i> Electricity and Magnetism (with lab)

PHYS 201	Waves and Optics
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Lab II
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics

MATH 101/102	Single Variable Calculus I and II
MATH 211 <i>or</i> MATH 221	Ordinary Differential Equations and Linear Algebra <i>or</i> Honors Calculus II

MATH 212 <i>or</i> MATH 222	Multivariable Calculus <i>or</i> Honors Calculus IV
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*Three courses from:*

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

*Four courses from:*

CHEM 365	Organic Chemistry Lab
CHEM 366	Inorganic Chemistry Lab
CHEM 367	Materials Chemistry Lab
CHEM 368	Chemical Measurement Lab
PHYS 331	Junior Physics Lab I
PHYS 332	Junior Physics Lab II
CHEM 491 <i>or</i> PHYS 461/462	Research for Undergraduates (up to 2 hours) <i>or</i> Independent Research

Two courses (six hours) of MATH *or* CAAM at the 300-level or above

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

## Chemical Physics 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
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	
CHEM 110	Freshman Chemistry Seminar	1		PHYS 102	Electricity & Magnetism (with lab)	4	
PHYS 101	Mechanics (with lab)	4		PHYS 104	E & M Discussion	0	
PHYS 103	Mechanics Discussion	0		MATH 102	Single Variable Calculus II	3	
MATH 101	Single Variable Calculus I	3		DIST	Distribution Course	3	
FWIS	First Year Writing-Intensive Seminar	3		OPEN	Open Elective	3	

SOPHOMORE			17 credits	SOPHOMORE			15 credits
CHEM 211	Organic Chemistry I	3		CHEM 215	Organic Chemistry Lab	2	
CHEM 213	Organic Chemistry Discussion	0		CHEM 360	Inorganic Chemistry	3	
CHEM 220	Undergraduate Chemistry Seminar	1		PHYS 202	Modern Physics	3	
PHYS 201	Waves & Optics	3		MATH 211	Differential Equations	3	
PHYS 231	Elementary Physics Lab	1		DIST	Distribution Course	3	
MATH 212	Multivariable Calculus	3		LPAP	Lifetime Physical Activity Elective	1	
DIST	Distribution Course	3					
OPEN	Open Elective	3					

JUNIOR			18 credits	JUNIOR			18 credits
CHEM 311	Physical Chemistry I	3		CHEM 312	Physical Chemistry II	3	
CHEM 391	Research for Undergraduates	3		CHEM 491	Research for Undergraduates	3	
PHYS 301	Intermediate Mechanics	4		PHYS 302	Intermediate Electrodynamics	4	
PHYS 331	Junior Physics Lab I	2		PHYS 332	Junior Physics Lab II	2	
DIST	Distribution Course	3		DIST	Distribution Course	3	
OPEN	Open Elective	3		OPEN	Open Elective	3	

SENIOR			17 credits	SENIOR			17 credits
CHEM 430	Quantum Chemistry	3		MATH/ CAAM	300+ level Elective	3	
CHEM 492	Undergraduate Honors Research	5		CHEM 493	Undergraduate Honors Research	5	
MATH/ CAAM	300+ level Elective	3		CHEM 420	Classical & Statistical Thermodynamics	3	
DIST	Distribution Course	3		DIST	Distribution Course	3	
OPEN	Open Elective	3		OPEN	Open Elective	3	

# Earth Science

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Do you want to climb active volcanoes, sail around Antarctica, explore the world's oceans, help the global environment, join geophysical expeditions, learn advanced laboratory skills, study the Earth's deep interior, and gain valuable job experience? Explore these opportunities with a degree from Rice in Earth Science.

The Department of Earth Science offers undergraduate students the opportunity to pursue exciting careers in energy, the environment, government, education, and academia. Our recently revised curriculum teaches skills that prepare students for the challenges of the 21st Century in geology, geophysics, geochemistry, environmental sciences, and more.

The BS major offers five tracks: geology, geochemistry, geophysics, environmental Earth science, or a self-designed track designed by the student and a faculty member (subject to the approval of a department undergraduate advisor). All of the programs of study include experiences with analytical equipment, computer systems, and fieldwork. The BA major provides greater flexibility of course choices.

## Degrees Offered

Earth Science

BS, BA

## Frank Advice

- Each student working towards a BS degree must complete advanced coursework for one track: Geology, Geochemistry, Geophysics, Environmental Earth Science, or a Self-Designed Track. Talk to older students, your professors, and your advisors to choose the track that best suits you.
- 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.
- Not required but highly recommended courses: Statistics, Environmental Science

## Earth Science BA - Requirements

MATH 101/102	Single Variable Calculus I and II
CHEM 121/123 or 151/153	General Chemistry I and General Chemistry Lab I or Honors Chemistry I and Honors Chemistry Lab I
CHEM 122/124 or 152/154	General Chemistry II and General Chemistry Lab II or Honors Chemistry II and Honors Chemistry Lab II
ESCI 301	Introduction to the Earth
ESCI 321	Earth System Evolution and Cycles
ESCI 322	Earth Chemistry and Materials
ESCI 323	Earth Structure and Deformation
ESCI 324	Earth's Interior
ESCI 334	Geological Techniques

Four additional ESCI courses

Two courses from NSCI or ENGR 200-level or above

*Two to four courses (minimum six credit hours) from one of the following groups:*

### **Introductory Biology I and II**

BIOC 201	Introductory Biology I
EBIO 202	Introductory Biology II

### **Intermediate Experimental Biosciences and Lab Modules**

BIOC 211	Intermediate Experimental Biosciences
EBIO 213	Intro Lab in Ecology and Evolutionary Biology

### **MATH/COMP/CAAM Options**

MATH 211	Differential Equations
COMP 110/NSCI 230 or CAAM 210	Computation in Natural Science or Introduction to Engineering Computation

### **Mechanics and Electricity and Magnetics**

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

# EARTH SCIENCE

## Earth Science BA

### SAMPLE DEGREE PLAN

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

#### FALL

FRESHMAN		15 credits	FRESHMAN		17 credits
ESCI 301	Intro 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

#### SPRING

#### SOPHOMORE

13 credits

#### SOPHOMORE

16 credits

ESCI 321	Earth System Evolution & Cycles	4	ESCI 324	Earth's Interior	4
ELECT	Elective Outside ESCI	3	ELECT	Elective Outside ESCI	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3

#### JUNIOR

16 credits

#### JUNIOR

15 credits

ESCI 322	Earth Chemistry & Materials	4	ESCI 334	Geological Techniques	3
ESCI	Upper Division Elective	3	ESCI	Upper Division Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3

#### SENIOR

15 credits

#### SENIOR

15 credits

ESCI	Upper Division Elective	3	ESCI	Upper Division Elective	3
NSCI/ENG	200+ level Elective	3	NSCI/ENG	200+ level Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

## Earth Science BS - Requirements

MATH 101/102	Single Variable Calculus I and II
CHEM 121/122/123/124*	General Chemistry I and II and General Chemistry Lab I and II
PHYS 101/103 <i>or</i> PHYS 111	Mechanics (with lab) and Mechanics Discussion <i>or</i> Mechanics (with lab)
PHYS 102/104 <i>or</i> PHYS 112	Electricity & Magnetism (with lab) and E & M Discussion <i>or</i> Electricity and Magnetism (with lab)
ESCI 301	Introduction to the Earth
ESCI 321	Earth System Evolution and Cycles
ESCI 322	Earth Chemistry and Materials
ESCI 323	Earth Structure and Deformation
ESCI 324	Earth's Interior
ESCI 334	Geological Techniques

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

*Each student must complete the additional courses for one specialization*

### Geology Specialization

MATH 211	Ordinary Differential Equations & Linear Algebra
ESCI 390	Geology Field Camp (at least 3 hours)
COMP 110 <i>or</i> CAAM 210	Computation in Natural Science <i>or</i> Introduction to Engineering Computation
ESCI 412 <i>or</i> ESCI 430	Advanced Petrology <i>or</i> Principles of Trace-Element and Isotope Geochemistry

*Two courses must be completed from Group A and Group B (four courses total):*

#### Group A

ESCI 421	Paleoceanography
ESCI 427	Sequence Stratigraphy
ESCI 431	Geomorphology
ESCI 435	Mechanics of Sediment Transport
ESCI 504	Siliciclastic Depositional Systems
ESCI 506	Carbonate Depositional Systems
ESCI 552	Marine Geology Systems

#### Group B

ESCI 410	Optical Mineralogy and Petrography
ESCI 418/CEVE 418	Quantitative Hydrogeology
ESCI 419	Materials Characterization
ESCI 426	Interpretation of Regional 2D Seismic Data
ESCI 429	Magmatic, Volcanic and Hydrothermal Processes
ESCI 442	Exploration Geophysics
ESCI 463	Structure and Evolution of Tectonic Systems
ESCI 464	Global Tectonics
ESCI 467	Geomechanics

## Earth Science BS - Requirements

### Geochemistry Specialization

BIOC 201	Introductory Biology
MATH 211	Ordinary Differential Equations and Linear Algebra
ESCI 391	Earth Science Field Experience (at least 3 hours)

*Four courses from:*

ESCI 340/EBIO 340/ENST 340	Global Biogeochemical Cycles
ESCI 410	Optical Mineralogy and Petrography
ESCI 412	Advanced Petrology
ESCI 419	Materials Characterization
ESCI 421	Paleoceanography
ESCI 425/CHEM 425/ENST 425	Organic Geochemistry
ESCI 426	Interpretation of Regional 2D Seismic Data
ESCI 429	Magmatic, Volcanic and Hydrothermal Processes
ESCI 430	Principles of Trace-Element & Isotope Geochemistry

*Two courses from:*

ESCI 300-level courses or above	
BIOC 211	Intermediate Experimental Biosciences
CAAM 210	Introduction to Engineering Computation
CEVE 401	Chemistry for Environmental Engineering & Lab Science
CEVE 434/534	Fate & Transport of Contaminants of the Environment
CEVE 550	Environmental Organic Chemistry
CHEM 211/213	Organic Chemistry I & Organic Chemistry Discussion
CHEM 212/214	Organic Chemistry II & Organic Chemistry Discussion II
CHEM 310	Physical Chemistry
CHEM 415	Chemical Kinetics and Dynamics
CHEM 495	Transition Metal Chemistry
COMP 110/NSCI 230	Computation Science and Engineering
EBIO 202	Introductory Biology
MATH 212	Multivariable Calculus

### Geophysics Specialization

COMP 110/NSCI 230 or CAAM 210	Computation in Natural Science or Introduction to Engineering Computation
ESCI 391	Earth Science Field Experience (at least three hours)
MATH 211	Ordinary Differential Equations and Linear Algebra
MATH 212	Multivariable Calculus
PHYS 201	Waves and Optics
PHYS 231	Elementary Physics Lab II



## Earth Science BS - Requirements

*(continued)*

Two courses from:

ESCI 418/CEVE 418	Quantitative Hydrogeology
ESCI 426	Interpretation of Regional 2D Seismic Data
ESCI 442	Exploration Geophysics
ESCI 450/CEVE 450	Remote Sensing
ESCI 452	GIS for Scientists
ESCI 461	Seismology I
ESCI 462	Tectonophysics
ESCI 463	Tectonic Systems
ESCI 464	Global Tectonics
ESCI 467	Geomechanics
ESCI 542	Seismology II
ESCI 440	Geophysical Data Analysis: Digital Signal Processing
ESCI 441	Geophysical Data Analysis: Inverse Methods
ESCI 564	Seismic Reflection Data Processing

Two courses from:

Any course from ESCI course offerings between ESCI 410 and ESCI 475, except for research and special studies

Any course from MATH, CAAM, or PHYS course offerings at the 300-level or above

CHEM 311                      Physical Chemistry

### Environmental Earth Science Specialization

BIOC 201	Introductory Biology
ESCI 391	Earth Science Field Experience (at least 3 hours)
MATH 211	Ordinary Differential Equations and Linear Algebra
STAT 280	Elementary Applied Statistics
COMP 110 or CAAM 210	Computation in Natural Science or Introduction to Engineering Computation

11 hours from the following, including at least two ESCI courses:

CEVE 401	Chemistry for Environmental Engineering & Science Lab
CEVE 406/ENST 406	Introduction to Environmental Law
CEVE 412	Hydrology and Water Resources Engineering
CEVE 434	Fate & Transport of Contaminants in the Environment
CHEM 211/213	Organic Chemistry and Organic Chemistry Discussion
CHEM 310	Physical Chemistry
EBIO 202	Introductory Biology
ESCI 340/EBIO 340/ENST 340	Global Biogeochemical Cycles
ESCI 410	Optical Mineralogy and Petrography
ESCI 418	Quantitative Hydrogeology
ESCI 419	Materials Characterization
ESCI 421	Paleoceanography

*(continued)*

## Earth Science BS - Requirements

*(continued)*

ESCI 425/CHEM 425/ENST 425	Organic Geochemistry
ESCI 426	Interpretation of Regional 2D Seismic Data
ESCI 429	Magmatic, Volcanic and Hydrothermal Processes
ESCI 431	Geomorphology
ESCI 435	Mechanics of Sediment Transport
ESCI 442	Exploration Geophysics
ESCI 452	GIS for Scientists
ESCI 463	Structure and Evolution of Tectonic Systems
ESCI 467	Geomechanics
ESCI 504	Siliciclastic Depositional Systems
ESCI 506	Carbonate Depositional Systems
ESCI 540	Earth's Atmosphere
ESCI 552	Marine Geology Systems
PHYS 201	Waves and Optics
PHYS 231	Elementary Physics Lab II

### Self-Designed Specialization

*Interested students are expected to submit a statement of rationale by the beginning of the third year.*

*Students must complete the following course:*

ESCI 391	Earth Science Field Experience (at least 3 hours)
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*Two courses from:*

BIOC 201	Introductory Biology
COMP 110/NSCI 230	Computation in Natural Science
CAAM 210	Introduction to Engineering Computation
CHEM 311/312	Physical Chemistry I and II
MATH 211	Ordinary Differential Equations and Linear Algebra
MATH 212	Multivariable Calculus
PHYS 201	Waves and Optics

Six courses (18 hours) of additional 300-level courses or above targeting a coherent theme and selected with approval of the department undergraduate advisor

# EARTH SCIENCE

## Earth Science BS/*Geology Specialization*

### SAMPLE DEGREE PLAN

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

#### FALL

FRESHMAN			FRESHMAN		
15 credits			17 credits		
ESCI 301	Intro 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

#### SPRING

SOPHOMORE			SOPHOMORE		
17 credits			17 credits		
ESCI 321	Earth System Evolution & Cycles	4	ESCI 324	Earth's Interior	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
MATH 211	Differential Equations	3	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3

JUNIOR			JUNIOR		
17 credits			15 credits		
ESCI 322	Earth Chemistry & Materials	4	ESCI 412	Advanced Petrology	3
ESCI 442	Exploration Geophysics	4	ESCI 334	Geological Techniques	3
DIST	Distribution Course	3	COMP 110	Computation in Natural Science	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3

JUNIOR SUMMER		
3 credits		
ESCI 390	Geology Field Camp	3

SENIOR			SENIOR		
16 credits			15 credits		
ESCI 463	Tectonic Systems	4	ESCI 427	Sequence Stratigraphy	3
DIST	Distribution Course	3	ESCI 506	Carbonate Depositional Systems	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

# Environmental Studies

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The interdisciplinary Environmental Studies program explores interconnection between humans and the natural environment, drawing courses from Biosciences, Earth Science, 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 to develop solutions to enhance the environment.

## Degrees Offered

Environmental Science	BS, BA
Environmental Studies	Minor

## Frank Advice

- The environmental science majors address environmental issues in the context of what we know about Earth, ecology, and society. Students declare a concentration in ecology and evolutionary biology or Earth science, which enhances the depth of study in that field.
- The environmental studies minor provides a cross-disciplinary holistic understanding of the challenges and solutions for creating a sustainable world. Undergraduates from a broad range of academic backgrounds undertake a cohesive program of study offering foundational literacy in the social, cultural, and scientific dimensions of environmental issues.
- No sample degree plans are shown for environmental studies as individual degree plans will vary widely based on the student's focus within the major. Consult the Major Advisors to create a personalized degree plan that best suits your needs.

## Environmental Science BA - Requirements

BIOC 201	Introductory Biology
EBIO 202	Introductory Biology II
CHEM 121/122/123/124*	General Chemistry I and II and General Chemistry Lab I and II
MATH 101/102*	Single Variable Calculus I and II
STAT 280 or STAT 305	Elementary and Applied Statistics or Introduction to Statistics for the Biosciences
ENST 100	Environmental Culture and Society
ESCI 107 or ESCI 109 or ESCI 201	Oceans and Global Change or Oceanography or Science Behind Global Warming
EBIO 213	Introduction to Experimental Ecology and Evolutionary Biology
EBIO 325	Ecology
ESCI 301	Introduction to the Earth
ENST 4xx	SEMINAR: Topics in Environmental Science

One to two courses (2-3 credit hours) of field experience courses from the list in the 2016 General Announcements

One advanced Social Sciences elective from the list in the 2016 General Announcements

One advanced Humanities and Architecture elective from the list in the 2016 General Announcements

One advanced Natural Science and Engineering elective from the list in the 2016 General Announcements

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

### **Major Concentration: Ecology and Evolutionary Biology**

*Two courses from:*

EBIO 270	Ecosystem Management
EBIO 323/ENST 323	Conservation Biology
EBIO 372	Coral Reef Ecosystems

*One course from:*

EBIO 270	Ecosystem Management
EBIO 321	Animal Behavior
EBIO 323/ENST 323	Conservation Biology
EBIO 326	Insect Biology
EBIO 331/BIOC 331	Biology of Infectious Disease
EBIO 334/BIOC 334	Evolution
EBIO 336	Plant Diversity
EBIO 338	Design and Analysis of Biological Experiments
EBIO 365	Introductory Phycology
EBIO 366	Applied Phycology
EBIO 372	Coral Reef Ecosystems
ESCI 340/EBIO340/ENST 340	Global Biogeochemical Cycles

## Environmental Science BA - Requirements

### Major Concentration: Earth Science

*Two courses from:*

ESCI 321	Earth Systems and Cycles
ESCI 323	Earth Structure and Deformation
ESCI 340/EBIO 340/ENST 340	Global Biogeochemical Cycles

*One course from:*

ESCI 321	Earth Systems and Cycles
ESCI 322	Earth Chemistry and Materials
ESCI 323	Earth Structure and Deformation
ESCI 340/EBIO 340/ENST 340	Global Biogeochemical Cycles
ESCI 380/FOTO 390	Visualizing Nature (if not selected for field course)
ESCI 418/CEVE 418	Quantitative Hydrogeology
ESCI 421	Paleoceanography
ESCI 425/CHEM 425/ENST 425	Organic Geochemistry
ESCI 430	Principles of Trace-Element and Isotope Geochemistry
ESCI 431	Geomorphology
ESCI 435	Mechanics of Sediment Transport
ESCI 452/CEVE 453	Geographic Information Science
ESCI 467	Geomechanics

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

MATH 111/112 may substitute for MATH 101/102

## Environmental Science BS - Requirements

BIOC 201	Introductory Biology
EBIO 202	Introductory Biology II
CHEM 121/122/123/124*	General Chemistry I and II and General Chemistry Lab I and II
MATH 101/102*	Single Variable Calculus I and II
STAT 280 <i>or</i> STAT 305	Elementary and Applied Statistics <i>or</i> Introduction to Statistics for the Biosciences
PHYS 101/103*	Mechanics (with lab) and Mechanics Discussion
PHYS 102/104*	Electricity and Magnetism (with lab) and E & M Discussion
ENST 100	Environmental Culture and Society
ESCI 107 <i>or</i> ESCI 109 <i>or</i> ESCI 201	Oceans and Global Change <i>or</i> Oceanography <i>or</i> Science Behind Global Warming
EBIO 213	Introduction to Experimental Ecology and Evolutionary Biology
EBIO 325	Ecology
ESCI 301	Introduction to the Earth
ENST 4xx	SEMINAR: Topics in Environmental Science

One to two courses (2-3 credit hours) of field experience courses from the list in the 2016 General Announcements

One advanced Social Sciences elective from the list in the 2016 General Announcements

One advanced Humanities and Architecture elective from the list in the 2016 General Announcements

One advanced Natural Science and Engineering elective from the list in the 2016 General Announcements

*One course (at least three credit hours) from:*

ESCI 390	Geologic Field Camp
ESCI 391	Earth Science Field Experience
EBIO 403 <i>or</i> 404	Undergraduate Honors Research
ESCI 481	Undergraduate Research in Earth Science

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

### **Major Concentration: Ecology and Evolutionary Biology**

*Two courses from:*

EBIO 270	Ecosystem Management
EBIO 323/ENST 323	Conservation Biology
EBIO 372	Coral Reef Ecosystems

*(continued)*

## Environmental Science BS - Requirements

### Ecology and Evolutionary Biology (continued)

One course from:

EBIO 270	Ecosystem Management
EBIO 321	Animal Behavior
EBIO 323/ENST 323	Conservation Biology
EBIO 326	Insect Biology
EBIO 331/BIOC 331	Biology of Infectious Disease
EBIO 334/BIOC 334	Evolution
EBIO 336	Plant Diversity
EBIO 338	Design and Analysis of Biological Experiments
EBIO 365	Intro Phycology
EBIO 366	Applied Phycology
EBIO 372	Coral Reef Ecosystems
ESCI 340/EBIO340/ENST 340	Global Biogeochemical Cycles

### Major Concentration: Earth Science

Two courses from:

ESCI 321	Earth Systems and Cycles
ESCI 323	Earth Structure and Deformation
ESCI 340/EBIO 340/ENST 340	Global Biogeochemical Cycles

One course from:

ESCI 321	Earth Systems and Cycles
ESCI 322	Earth Chemistry and Materials
ESCI 323	Earth Structure and Deformation
ESCI 340/EBIO 340/ENST 340	Global Biogeochemical Cycles
ESCI 380/FOTO 390	Visualizing Nature (if not selected for field course)
ESCI 418/CEVE 418	Quantitative Hydrogeology
ESCI 421	Paleoceanography
ESCI 425/CHEM 425/ENST 425	Organic Geochemistry
ESCI 430	Principles of Trace-Element and Isotope Geochemistry
ESCI 431	Geomorphology
ESCI 435	Mechanics of Sediment Transport
ESCI 452/CEVE 453	Geographic Information Science
ESCI 467	Geomechanics

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

MATH 111/112 may substitute for MATH 101/102

PHYS 111/112 or PHYS 125/126 may substitute for PHYS 101/102/103/104



## Environmental Studies Minor - Requirements

ENST 100                      Environment, Culture and Society

*One course from:*

EBIO 124                      Introduction to Ecology and Evolutionary Biology

ESCI 101                      The Earth

ESCI 107                      Oceans and Global Change

ESCI 109                      Oceanography

ESCI 201                      The Science Behind Earth Global Warming and Climate Change

Two Architecture, Humanities, and Social Sciences courses from the list in the 2016 General Announcements

Two Engineering and Natural Science courses from the list in the 2016 General Announcements

# Global Health Technologies

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The Rice 360° Institute for Global Health collaborates with multiple departments to offer students a minor in Global Health Technologies. The minor is open to Rice undergraduate students from all disciplines. In the capstone course, multidisciplinary teams of undergraduate students work together to design and implement solutions to existing global health challenges in the developing world. Students benefit from receiving guidance and mentorship from Rice faculty and graduate students as well as from the Texas Medical Center, partner organizations in developing countries, and clinicians to design low-cost, effective health technologies.

## Degree Offered

Global Health Technologies      Minor

## Frank Advice

- The minor in global health technologies (GLHT) is a unique, multidisciplinary program that educates and trains students to reach beyond traditional disciplinary and geographic boundaries to understand, address, and solve global health disparities.
- The GLHT minor aims to create future leaders who can develop effective solutions to significant world health challenges. Many students pursuing the GLHT minor enter careers in medicine, public health, public policy, and international development.
- You are not required to start the GLHT minor in your freshman year; it can be started as late as the Fall semester of your junior year. It is possible for students to receive credit for GLHT minor courses that also fulfill a requirement within their major.

## Global Health Technologies Minor - Requirements

GLHT 201

Bioengineering for Global Health Environments

GLHT 360

Appropriate Design for Global Health

*One course from:*

PSYC 370

Introduction to Human Factors and Ergonomics

SOCI 345

Medical Sociology

SOCI 381

Research Methods

ANTH 381

Medical Anthropology

GLHT 392

Needs Finding and Development in Bioengineering

GLHT 464/BUSI 464

Social Entrepreneurship

GLHT 451/452

Global Health Design Challenges I and II

Three credit hours in science/engineering elective courses from the list in the 2016 General Announcements

Three credit hours in humanities/social science elective courses from the list in the 2016 General Announcements

*Note: The sequence indicated is the required sequence, as prerequisites do apply.*

# Kinesiology

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The Kinesiology department is home to two distinct programs (Health Sciences and Sports Medicine) and is one of the first of its kind in the nation to allow students to concentrate their studies in one of these specific sub-disciplines. A flexible curriculum permits undergraduate majors to tailor their coursework to their particular postgraduate needs and also permits 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 program 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 program 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**

Kinesiology BA

## **Frank Advice**

- Students choosing to major in Kinesiology must choose a concentration in either Health Sciences or Sports Medicine when declaring their major. Consult with the department advisor for your program 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 every other year.

# Kinesiology

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- If you are a Sports Medicine major, take KINE 300, Human Anatomy, as soon as possible. Most KINE classes refer to some elements of human anatomy.
- Qualified students are encouraged to participate in an independent study. This independent study 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.
- 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 medical setting for potentially every medical specialty in practice.
- Not required but highly recommended: Take KINE 120, Scientific Foundations of Kinesiology, during the summer before freshman year or the spring of freshman year to get an overview of Kinesiology.

## Kinesiology BA/Health Sciences - Requirements

HEAL 119	Introduction to Health and Wellness
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

*Eight courses (24 hours) from:*

ANTH 210	Anthropology of Death
ANTH 381	Medical Anthropology
ANTH 386	Medical Anthropology of Food and Health
ANTH 388	The Life Cycle: A Biocultural View
ANTH 446	Advanced Biomedical Anthropology
BIOC 201	Introductory Biology
BIOC 122	Fundamental Concepts in Biology
BIOE 360	Appropriate Design for Global Health
ENGL 272	Literature and Medicine
ENGL 273	Medicine and Media
ENST 315	Environmental Health
GLHT 201	Bioengineering and World Health
HEAL 103	Nutrition
HEAL 132	Medical Terminology
HEAL 208	Chemical Alterations of Behavior
HEAL 212	Consumer Health and the Media
HEAL 306	Human Sexuality
HEAL 350	Understanding Cancer
HEAL 360	Violence in America: A Public Health Perspective
HEAL 379	Internship in Health Sciences
HEAL 380	Disparities in Health in America
HEAL 485	Seminar on International Health Problems
HEAL 495/496	Independent Studies in Health Sciences
HEAL 498	Special Topics in Health Sciences
KINE 300	Human Anatomy
KINE 301	Human Physiology
KINE 326	Exercise Epidemiology
KINE 440	Research Methods
PHIL 314	The Philosophy of Medicine
PHIL 315	Ethics, Medicine and Public Policy
PHIL 336	Topics in Medical Ethics
POLI 329	Health Policy
PSYC 345	Health Psychology
SOCI 313	Demography
SOCI 345	Medical Sociology
SOCI 355	Sociology of Drugs and Alcohol
SOCI 465	Gender and Health
SOSC 330	Health Care Reform in the 50 States
SOSC 398	Pharmaceutical Politics and Policy
SOSC 430	The Shaping of Health Policy

Kinesiology BA/Health Sciences

**SAMPLE DEGREE PLAN**

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

**FALL**

**SPRING**

<b>FRESHMAN</b>			<b>FRESHMAN</b>		
<b>15 credits</b>			<b>16 credits</b>		
HEAL 119	Intro 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
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			LPAP	Lifetime Physical Activity Elective	1

  

<b>SOPHOMORE</b>			<b>SOPHOMORE</b>		
<b>15 credits</b>			<b>15 credits</b>		
HEAL 222	Principles of Public & Community Health	3	HEAL 313	Foundations of Health Promotion & Education	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
DIST	Distribution Course	3	OPEN	Open Elective	3

  

<b>JUNIOR</b>			<b>JUNIOR</b>		
<b>15 credits</b>			<b>15 credits</b>		
HEAL 407	Epidemiology	3	HEAL 422	Theories & Models of Health Behavior	3
ELECT	Health Sciences Elective	3	ELECT	Health Sciences Elective	3
DIST	Distribution Course	3	ELECT	Health Sciences Elective	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3

  

<b>SENIOR</b>			<b>SENIOR</b>		
<b>15 credits</b>			<b>15 credits</b>		
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

## Kinesiology BA/Sports Medicine - Requirements

HEAL 103	Nutrition
KINE 300	Human Anatomy
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 323	Exercise Physiology Laboratory
KINE 325	Motor Learning Laboratory
KINE 440	Research Methods

*Five courses (15 hours) from:*

BIOC 201	Introductory Biology
BIOC 211	Introductory Experimental Biosciences
BIOC 301	Biochemistry I
BIOC 302	Biochemistry II
BIOC 311	Advanced Experimental Biosciences
BIOC 313	Introductory Synthetic Biology
BIOC 372	Immunology
CHEM 121/123	General Chemistry I and General Chemistry Lab I
CHEM 122/124	General Chemistry II and General Chemistry Lab II
CHEM 151/153	Honors Chemistry I and Honors Chemistry Lab I
CHEM 152/154	Honors Chemistry II and Honors Chemistry Lab II
EBIO 202	Introductory Biology II
KINE 120	Scientific Foundations of Kinesiology
HEAL 132	Medical Terminology
KINE 351	Human Anatomy Lab
KINE 326	Exercise Epidemiology
KINE 375	Sports Medicine Internship
KINE 403	Sports Nutrition
HEAL 407	Epidemiology
KINE 410	Case Studies in Human Performance
KINE 412	Motor Control
KINE 421	Adv. Topics in Exercise Phys. & Preventative Medicine
KINE 441	Muscle Physiology and Plasticity
KINE 495/496	Independent Study in Sports Medicine
KINE 498	Special Topics in Sports Medicine
KINE 499	Teaching Practicum in Sports Medicine
PHYS 101/PHYS 103	Mechanics (with lab) and Mechanics Discussion
PHYS 102/PHYS 104	Electricity & Magnetism (with lab) and E & M Discussion
PHYS 125	General Physics I (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



## Kinesiology BA/Sports Medicine

### SAMPLE DEGREE PLAN

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

FALL			SPRING		
<b>FRESHMAN</b>		<b>15 credits</b>	<b>FRESHMAN</b>		<b>16 credits</b>
HEAL 103	Nutrition	3	KINE 120	Foundations of Kinesiology (Elective)	3
FWIS	First Year Writing-Intensive Seminar	3	ELECT	Kinesiology Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
			LPAP	Lifetime Physical Activity Elective	1
<b>SOPHOMORE</b>		<b>15 credits</b>	<b>SOPHOMORE</b>		<b>15 credits</b>
KINE 319	Statistics for the Health Professional	3	KINE 300	Human Anatomy	3
ELECT	Kinesiology Elective	3	ELECT	Kinesiology Elective	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
<b>JUNIOR</b>		<b>16 credits</b>	<b>JUNIOR</b>		<b>13 credits</b>
KINE 311	Motor Learning	3	KINE 321	Exercise Physiology	3
KINE 325	Motor Learning Lab	1	KINE 323	Exercise Physiology Lab	1
KINE 301	Human Physiology	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			
<b>SENIOR</b>		<b>15 credits</b>	<b>SENIOR</b>		<b>15 credits</b>
KINE 302	Biomechanics	3	KINE 310	Psychological Aspects of Sport & Exercise	3
OPEN	Open Elective	3	KINE 440	Research Methods	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

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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 Ph.D. 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

## Frank Advice

- The Math department provides detailed information about choosing the proper math course for your first semester at Rice. Visit their website, looking under Academics > Undergraduate > Advising and Transfer Credit for their advice on class selection for first-year students.

# Mathematics

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- 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 221-222 and MATH 354 Honors Linear Algebra in your first year.
- 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](http://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

## Mathematics BA - Requirements

MATH 101  
MATH 102

Single Variable Calculus I  
Single Variable Calculus II

MATH 211 *and* 212  
*or*  
MATH 221 *and* 222

Ordinary Differential Equations and Linear Algebra *and*  
Multivariable Calculus *or*  
Honors Calculus III *and* IV

Eight courses (24 hours ) of MATH courses at the 300-level or above

No sample degree plan is shown for the Math BA as individual degree plans will vary widely based on your background and interests. Consult one of the Major Advisors to create a personalized degree plan that best suits your needs.

## Mathematics BS - Requirements

MATH 101	Single Variable Calculus I
MATH 102	Single Variable Calculus II
<i>One course from:</i>	
MATH 211	Ordinary Differential Equations and Linear Algebra
MATH 381	Intro to Partial Differential Equations
MATH 423/CAAM 423	Partial Differential Equations I
<i>One to two courses from:</i>	
MATH 212	Multivariable Calculus
MATH 221 and 222	Honors Calculus III and IV
<i>One course from:</i>	
MATH 221	Honors Calculus III
MATH 354	Honors Linear Algebra
MATH 355	Linear Algebra
<i>Two courses from:</i>	
MATH 321	Intro to Analysis I
MATH 322	Intro to Analysis II
MATH 425	Integration Theory
MATH 356	Abstract Algebra I
MATH 463	Abstract Algebra II
<i>One course from:</i>	
MATH 370	Calculus on Manifolds
MATH 401	Differential Geometry
MATH 402	Differential Geometry
<i>One course from:</i>	
MATH 382	Complex Analysis
MATH 427	Complex Analysis
<i>One course from:</i>	
MATH 443	General Topology
MATH 444	Geometric Topology
MATH 445	Algebraic Topology

A total of at least 33 hours of MATH course offerings at the 300-level or above is required

## 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
MATH 354	Honors Linear Algebra	3	MATH 302	Elements of Analysis <i>or</i> Elements of Knot Theory	3
FWIS	First Year Writing-Intensive Seminar	3	LPAP	Lifetime Physical Activity Elective	1
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3
SOPHOMORE		15 credits	SOPHOMORE		15 credits
MATH 331	Honors Analysis	3	MATH 322	Intro to Analysis II	3
MATH 365	Number Theory	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 423	Partial Differential Equations I	3	MATH 370	Calculus on Manifolds	3
MATH 463	Abstract Algebra II	3	MATH 443	General Topology	3
MATH 368	Topics in Combinatorics	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
MATH 401	Differential Geometry	3	MATH 427	Complex Analysis	3
MATH 425	Integration Theory	3	MATH 499	Mathematical Sciences Vigre Seminar	3
MATH 444	Geometric Topology	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

## Mathematics Minor - Requirements

*One course from:*

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

*One course from:*

MATH 356	Abstract Algebra
MATH 365	Number Theory
MATH 368	Topics in Combinatorics

*One course from:*

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

Three additional courses (nine hours) from MATH course offerings

# Neuroscience

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Neuroscience is the study of the brain and nervous system: how it develops, how it works, and what happens when it doesn't work properly. Neuroscience is a multidisciplinary field that encompasses most areas of modern science, from genetics and biology, to mathematics and engineering, to social and physical sciences, to medicine. The goal of neuroscience is to understand the brain, the most complex organ ever studied in the known universe and to use that information to enrich humankind and to treat and cure brain disorders.

The neuroscience minor is administered by the Department of Biosciences and involves participation in core and elective courses at Rice, Baylor College of Medicine, and the University of Texas Health Sciences Center as well as research in active faculty laboratories throughout the Texas Medical Center

## Degrees Offered

Neuroscience                      Minor

## Frank Advice

- Each student undertaking a minor in neuroscience chooses one of two unique tracks. The Humanities and Social Sciences track represents cognitive and behavioral approaches to neuroscience, while the Natural Sciences and Engineering track represents genetics, cellular/molecular, bioengineering, computation, and systems-level investigations.
- There is one required core course for the minor (NEUR 380) and two elective core courses dependent on the chosen track (NEUR 362 and NEUR 385). All three courses are offered in the Spring and any of them are an appropriate first course to choose as an introduction to the neuroscience minor.
- NEUR 485 gives credit for research. One 3 credit course can count toward the minor, but you can repeat the course as often as you wish. It is fine to do research in different labs, but if you find a lab you like, stick with it so you may be able to accomplish a project and have your name on a scientific journal article.



## Neuroscience Minor - Requirements

NEUR 380/PSYC 380/BIOC 380 Fundamental Neuroscience Systems

*Each student must also complete the requirements for one track.*

### Humanities and Social Sciences Track

NEUR 362/PSYC 362 Cognitive Neuroscience: Exploring the Living Brain

Three courses from the Humanities and Social Science electives listed in the 2016 General Announcements

One course from the Natural Sciences and Engineering electives listed in the 2016 General Announcements

### Natural Sciences and Engineering Track

NEUR 385/BIOC 385 Fundamentals of Cellular and Molecular Neuroscience

Three courses from the Natural Sciences and Engineering electives listed in the 2016 General Announcements

One course from the Humanities and Social Science electives listed in the 2016 General Announcements

# Physics and Astronomy

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Students in the Department of Physics and Astronomy will acquire and demonstrate a solid foundation of knowledge in physics and/or astronomy and deeper knowledge of subdivisions of the field related to their interests. They will build the theoretical, computational, 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.

The Chemical Physics degree is jointly offered by the Department of Physics and Astronomy and the Department of Chemistry. 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. See the Chemistry Department section for degree requirements and a sample degree plan.

## Degrees Offered

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

# Physics and Astronomy

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## Frank Advice

- Talk to the PHYS 111 instructor about AP physics. It is usually better to take PHYS 111/112 rather than jumping straight into PHYS 201. If you are unsure what to do, speak with the PHYS 111 instructor.
- The BA degree, particularly, can be solid preparation for medical school, law school, or teaching, but you will need additional course work specific to those areas.
- A senior research project and thesis are required for the BS degrees. Prior to that, there are summer research experiences available with faculty in the department and at many other universities and national labs. Announcements are 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

PHYS 101/103 <i>or</i> 111	Mechanics (with lab) and Mechanics Discussion <i>or</i> Mechanics (with lab)
PHYS 102/104 <i>or</i> 112	Electricity and Magnetism (with lab) and E & M Discussion <i>or</i> Electricity and Magnetism (with lab)
PHYS 201	Waves and Optics
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Laboratory
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
PHYS 311	Introduction to Quantum Physics I
PHYS 331	Junior Physics Laboratory I
PHYS 425	Statistical and Thermal Physics
One 400-level PHYS <i>or</i> ASTR course (three hours)	
MATH 101/102	Single Variable Calculus I and II
MATH 211*	Ordinary Differential Equations and Linear Algebra
MATH 212*	Multivariable Calculus
<i>One course from:</i>	
NSCI 230/COMP110	Computation in Science and Engineering
CAAM 210	Introduction to Engineering Computation
One MATH <i>or</i> CAAM course at 300-level or above	

\* MATH 221/222 may substitute for MATH 211/212

# PHYSICS & ASTRONOMY

## Physics BA

### SAMPLE DEGREE PLAN

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

<b>FALL</b>				<b>SPRING</b>			
<b>FRESHMAN</b>		<b>14 credits</b>		<b>FRESHMAN</b>		<b>16 credits</b>	
PHYS 101	Mechanics (with lab)	4		PHYS 102	Electricity & Magnetism (with lab)	4	
PHYS 103	Mechanics Discussion	0		PHYS 104	E & M Discussion	0	
MATH 101	Single Variable Calculus I	3		MATH 102	Single Variable Calculus II	3	
FWIS	First Year Writing-Intensive Seminar	3		DIST	Distribution Course	3	
LPAP	Lifetime Physical Activity Elective	1		OPEN	Open Elective	3	
OPEN	Open Elective	3		OPEN	Open Elective	3	
<b>SOPHOMORE</b>		<b>16 credits</b>		<b>SOPHOMORE</b>		<b>14 credits</b>	
PHYS 201	Waves & Optics	3		PHYS 202	Modern Physics	3	
PHYS 231	Elementary Physics Lab	1		PHYS 331	Junior Physics Lab I	2	
MATH 212	Multivariable Calculus	3		MATH 211	Differential Equations	3	
DIST	Distribution Course	3		DIST	Distribution Course	3	
OPEN	Open Elective	3		OPEN	Open Elective	3	
OPEN	Open Elective	3					
<b>JUNIOR</b>		<b>16 credits</b>		<b>JUNIOR</b>		<b>16 credits</b>	
PHYS 301	Intermediate Mechanics	4		PHYS 302	Intermediate Electrodynamics	4	
PHYS 311	Intro to Quantum Physics I	3		CAAM 210	Intro to Engineering Computation	3	
DIST	Distribution Course	3		DIST	Distribution Course	3	
OPEN	Open Elective	3		OPEN	Open Elective	3	
OPEN	Open Elective	3		OPEN	Open Elective	3	
<b>SENIOR</b>		<b>15 credits</b>		<b>SENIOR</b>		<b>15 credits</b>	
PHYS 425	Statistical & Thermal Physics	3		PHYS 4xx	400-level 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	
OPEN	Open Elective	3		OPEN	Open Elective	3	

## Physics BS - Requirements

PHYS 101/103 <i>or</i> 111	Mechanics (with lab) and Mechanics Discussion <i>or</i> Mechanics (with lab)
PHYS 102/104 <i>or</i> 112	Electricity and Magnetism (with lab) and E & M Discussion <i>or</i> Electricity and Magnetism (with lab)
PHYS 201	Waves and Optics
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Laboratory
PHYS 301	Intermediate Mechanics
PHYS 311	Introduction to Quantum Physics I
PHYS 425	Statistical and Thermal Physics
PHYS 491/493	Undergraduate Research and Undergraduate Research Seminar
PHYS 492/494	Undergraduate Research and Undergraduate Research Seminar
MATH 101/102	Single Variable Calculus I and II
MATH 211 <i>or</i> 221	Ordinary Differential Equations and Linear Algebra <i>or</i> Honors Calculus III
MATH 212 <i>or</i> 222	Multivariable Calculus <i>or</i> Honors Calculus IV

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

### Major Concentration: General Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312	Introduction to Quantum Physics II
PHYS 331 <i>and</i> 332	Junior Physics Laboratory I <i>and</i> II
PHYS 411	Introduction to Nuclear and Particle Physics
PHYS 412	Solid State Physics

*Two courses from either the MATH or CAAM course groups:*

MATH 381 <i>and</i> 382	Introduction to Partial Differential Equations <i>and</i> Complex Analysis
CAAM 335 <i>and</i> 336	Matrix Analysis <i>and</i> Differential Equations in Science and Engineering
CHEM 121/122/123/124*	General Chemistry I and II <i>and</i> General Chemistry Lab I and II

### Major Concentration: Applied Physics

PHYS 302	Intermediate Electrodynamics <i>or</i> ELEC 306 Applied Electromagnetics
PHYS 312	Introduction to Quantum Physics II <i>or</i> ELEC 361 Quantum Mechanics for Engineers

*Two courses from:*

PHYS 331	Junior Physics Lab I
PHYS 332	Junior Physics Lab II
ELEC 364	Photonics Measurements

PHYS 412	Solid State Physics (or approved substitute in applied physics)
ELEC 242	Fundamentals of Electrical Engineering II <i>and</i> ELEC 244 Fundamentals of Electrical Engineering II Lab
	<i>or</i> ELEC 243 Electronic Measurement Systems
ELEC 305	Introduction to Physical Electronics
MATH 381	Introduction to Partial Differential Equations <i>or</i> CAAM 336 Differential Equations in Science and Engineering
CHEM 121/122/123/124*	General Chemistry I and II <i>and</i> General Chemistry Lab I and II

## Physics BS - Requirements

### Major Concentration: Biological Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312	Introduction to Quantum Physics II
PHYS 355	Introduction to Biological Physics
BIOC 201	Introductory Biology
BIOC 211	Intermediate Experimental Biosciences
BIOC 301 <i>or</i> 341	Biochemistry I <i>or</i> Cell Biology
CHEM 121/122/123/124*	General Chemistry I & II <i>and</i> General Chemistry Lab I & II
CHEM 211/213	Organic Chemistry <i>and</i> Organic Chemistry Discussion
MATH 381 <i>or</i> CAAM 336	Introduction to Partial Differential Equations <i>or</i> Differential Equations in Science and Engineering

### Major Concentration: Computational Physics

PHYS 302	Intermediate Electrodynamics
PHYS 312	Introduction to Quantum Physics II
PHYS 416	Computational Physics
CAAM 335	Matrix Analysis
CAAM 336	Differential Equations in Science and Engineering
CAAM 210	Introduction to Engineering Computation
CAAM 453	Numerical Analysis I
CAAM 519	Computational Science I

*One course from:*

CAAM 435	Dynamical Systems
CAAM 454	Numerical Analysis II
CAAM 520	Computational Science II
CAAM 536	Numerical Methods for Partial Differential Equations
CHEM 121/123 *	General Chemistry I <i>and</i> General Chemistry Lab I

\* CHEM 151/153 may substitute for CHEM 121/123

CHEM 152/154 may substitute for CHEM 122/124

# PHYSICS & ASTRONOMY

## Physics BS / Major Concentration: General Physics

### SAMPLE DEGREE PLAN

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

FALL			SPRING		
FRESHMAN		18 credits	FRESHMAN		17 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
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
OPEN	Open Elective	3			
SOPHOMORE		16 credits	SOPHOMORE		17 credits
PHYS 201	Waves & Optics	3	PHYS 202	Modern Physics	3
PHYS 231	Elementary Physics Lab	1	PHYS 331	Junior Physics Lab I	2
MATH 212	Multivariable Calculus	3	MATH 211	Differential Equations	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		16 credits	JUNIOR		18 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	3	PHYS 332	Junior Physics Lab II	2
DIST	Distribution Course	3	CAAM 335	Matrix Analysis	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		18 credits
PHYS 411	Intro to Nuclear & Particle Physics	3	PHYS 412	Solid State Physics	3
PHYS 425	Statistical & 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	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
			OPEN	Open Elective	3



## Physics Minor - Requirements

PHYS 101/103 <i>or</i> 111	Mechanics (with lab) and Mechanics Discussion <i>or</i> Mechanics (with lab)
PHYS 102/104 <i>or</i> 112	Electricity and Magnetism (with lab) and E & M Discussion <i>or</i> Electricity and Magnetism (with lab)
MATH 101/102	Single Variable Calculus I and II
MATH 211*	Ordinary Differential Equations and Linear Algebra
MATH 212*	Multivariable Calculus
PHYS 201	Waves and Optics
PHYS 202	Modern Physics

Nine additional credit hours of PHYS coursework at the 300-level or above

\* MATH 221/222 may substitute for MATH 211/212

## Astronomy BA - Requirements

PHYS 101/103 or 111	Mechanics (with Lab) and Mechanics Discussion or Mechanics (with lab)
PHYS 102/104 or 112	Electricity and Magnetism (with Lab) and E & M Discussion or Electricity and Magnetism (with Lab)
PHYS 201	Waves and Optics
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Laboratory
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
ASTR 230	Astronomy Laboratory
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxy and Cosmos
ASTR 400	Undergraduate Research Seminar (two credits)

*One course 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

MATH 101/102	Single Variable Calculus
MATH 211*	Ordinary Differential Equations and Linear Algebra
MATH 212*	Multivariable Calculus
MECH 200	Classical Thermodynamics

*One course from:*

PHYS 331	Junior Physics Lab I
NSCI 230/COMP 110	Computation in Science and Engineering
CAAM 210	Introduction to Engineering Computation

\* MATH 221/222 may substitute for MATH 211/212

## Astronomy BA

### SAMPLE DEGREE PLAN

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

#### FALL

#### SPRING

FRESHMAN			FRESHMAN		
17 credits			16 credits		
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 103	Mechanics Discussion	0	PHYS 104	E & M Discussion	0
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
FWIS	First Year Writing-Intensive Seminar	3	DIST	Distribution Course	3
LPAP	Lifetime Physical Activity Elective	1	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3			
SOPHOMORE			SOPHOMORE		
16 credits			15 credits		
PHYS 201	Waves and Optics	3	PHYS 202	Modern Physics	3
PHYS 231	Elementary Physics Lab	1	MATH 211	Differential Equations	3
MATH 212	Multivariable Calculus	3	ASTR 230	Astronomy Lab	3
DIST	Distribution Course	3	MECH 200	Classical Thermodynamics	3
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3			
JUNIOR			JUNIOR		
14 credits			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	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR			SENIOR		
15 credits			15 credits		
ASTR 451	Astrophysics I - Sun and Stars	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	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

## Astrophysics BS - Requirements

PHYS 101/103 or 111	Mechanics (with lab) and Mechanics Discussion or Mechanics (with lab)
PHYS 102/104 or 112	Electricity and Magnetism (with lab) and E & M Discussion or Electricity and Magnetism (with lab)
PHYS 201	Waves and Optics
PHYS 202	Modern Physics
PHYS 231	Elementary Physics Laboratory II
PHYS 301	Intermediate Mechanics
PHYS 302	Intermediate Electrodynamics
PHYS 311	Introduction to Quantum Physics I
PHYS 425	Statistical and Thermal Physics
PHYS 491/493	Undergraduate Research and Undergraduate Research Seminar
PHYS 492/494	Undergraduate Research and Undergraduate Research Seminar
ASTR 230	Astronomy Lab
ASTR 350	Introduction to Astrophysics - Stars
ASTR 360	Introduction to Astrophysics - Galaxy and Cosmos
ASTR 400	Undergraduate Research Seminar (two credits)
<i>Three courses from:</i>	
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
MATH 101/102	Single Variable Calculus I and II
MATH 211*	Ordinary Differential Equations and Linear Algebra
MATH 212*	Multivariable Calculus
CAAM 336	Differential Equations in Science and Engineering
NSCI 230/COMP 110	Computation in Science and Engineering or
or CAAM 210	Introduction to Engineering Computation
MECH 200	Classical Thermodynamics

\* MATH 221/222 may substitute for MATH 211/212

## 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		18 credits
PHYS 201	Waves and Optics	3	PHYS 202	Modern Physics	3
PHYS 231	Elementary Physics Lab	1	MATH 211	Differential Equations	3
MATH 212	Multivariable Calculus	3	CAAM 210	Intro to Engineering Computation	3
DIST	Distribution Course	3	ASTR 230	Astronomy Lab	3
OPEN	Open Elective	3	MECH 200	Classical Thermodynamics	3
OPEN	Open Elective	3	DIST	Distribution Course	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
CAAM 336	Differential Equations in Science and Engineering	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
SENIOR		15 credits	SENIOR		18 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

# Degree Requirements

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

- Be registered at Rice full time for at least four full fall and/or spring semesters
- Complete the requirements of at least one major degree program
- Complete at least 120 semester hours (some degree programs require more than 120 hours)
- Complete at least 60 semester hours at Rice University
- Complete at least 48 hours of all degree work in upper-level courses (at the 300 level or higher)
- Complete more than half of the upper-level courses in degree work at Rice
- Complete more than half of the upper-level courses in their major work at Rice (certain departments may specify a higher proportion)
- Complete at least 60 hours outside of their major for Bachelor of Arts and Bachelor of Science degrees (exceptions: requirement does not apply to Bachelor of Science degrees with an engineering major; Architecture majors are required to complete only 36 hours outside the major)
- Complete all Rice courses satisfying degree requirements with a cumulative grade point average of at least 1.67 or higher
- Complete all Rice courses that satisfy major and/or minor requirements (as designated by the department) with a cumulative grade point average of at least 2.00 or higher
- Satisfy the Writing and Communication requirement
- Complete one Lifetime Physical Activity Program (LPAP) course for one credit. Students with disabilities may make special arrangements to satisfy this requirement
- Complete courses to satisfy the distribution requirements (see below)
- Otherwise be a student in good academic and disciplinary standing and not under investigation

# Degree Requirements

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## **Distribution Requirements**

Each student is required to complete at least 12 semester hours of designated distribution courses in each of Groups I, II, and III. The 12 hours in each group must include courses in at least two departments in that group.

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 department
- Fulfill all requirements for the second degree
- Complete at least 30 additional semester hours at Rice beyond the hours required for their first degree (these hours are applied to the second degree)

# Major Advisors

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## BIOSCIENCES

### Biochemistry and Cell Biology

#### Pre-prospective and prospective students/freshmen and undeclared sophomores

Beth Beason-Abmayr	bbeason@rice.edu
Liz Eich	lizmc@rice.edu
Kathy Matthews	ksm@rice.edu
James McNew	mcnew@rice.edu
Alma Novotny	novotnya@rice.edu
Dereth Phillips	derethp@rice.edu
Yousif Shamoo	shamoo@rice.edu

#### Declared Majors and Minors

Kathleen Beckingham (A-H)	kate@rice.edu
David Caprette (I-P)	caprette@rice.edu
Charles Stewart (Q-Z)	crs@rice.edu

#### Study Abroad Transfer Credit

George Bennett	gbennett@rice.edu
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#### Transfer Credit

Dave Caprette	caprette@rice.edu
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### Ecology and Evolutionary Biology

Adrienne Correa	adrienne.correa@rice.edu
Scott Solomon	scott.solomon@rice.edu

#### Study Abroad Transfer Credit and Transfer Credit

Scott Solomon	scott.solomon@rice.edu
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## CHEMISTRY (listed by residential college)

<b>Baker</b>	Kristi Kincaid	kristi.kincaid@rice.edu
<b>Brown</b>	Zach Ball	zb1@rice.edu
<b>Duncan</b>	Michelle Gilbertson	mlg7@rice.edu
<b>Hanszen</b>	Jeff Hartgerink	jd@rice.edu
<b>Jones</b>	Bruce Weisman	weisman@rice.edu
<b>Lovett</b>	Angel Martí	aam4@rice.edu
<b>Martel</b>	Lesla Tran	lesla@rice.edu
<b>McMurtry</b>	Seiichi Matsuda	matsuda@rice.edu
<b>Sid Rich</b>	Lon Wilson	durango@rice.edu
<b>Sid Rich</b>	Ken Whitmire	whitmire@rice.edu
<b>Wiess</b>	Christy Landes	cflandes@rice.edu
<b>Will Rice</b>	Julianne Yost	jyost@rice.edu

#### Transfer Credit

Phil Brooks	brooks@rice.edu
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# Major Advisors

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## EARTH SCIENCE

### Geology and Environmental

André Droxler                      andre@rice.edu

### Geology and Geochemistry

Julia Morgan                      morganj@rice.edu

### Geology and Geophysics

Dale Sawyer                      dale@rice.edu

### Transfer Credit

Julia Morgan                      morganj@rice.edu  
Dale Sawyer                      dale@rice.edu

## ENVIRONMENTAL STUDIES

### ENVIRONMENTAL SCIENCE

#### Earth Science Concentration

André Droxler                      andre@rice.edu

#### Ecology and Evolutionary Biology Concentration

Evan Siemann                      siemann@rice.edu

#### Minor Advisor

Dominic Boyer                      dcb2@rice.edu

#### Transfer Credit

André Droxler                      andre@rice.edu

## GLOBAL HEALTH TECHNOLOGIES

Veronica Leautaud                      c12@rice.edu

## KINESIOLOGY

### Health Sciences

Heidi Perkins                      hperkins@rice.edu  
Nick Iammarino                      nki@rice.edu  
Augusto Rodriguez                      axr1@rice.edu

### Sports Medicine

Augusto Rodriguez                      axr1@rice.edu  
Bruce Etnyre                      etnyre@rice.edu

### Transfer Credit

Nick Iammarino                      nki@rice.edu

# Major Advisors

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## MATHEMATICS

### Major Advisors

Zhiyong Gao	zgao@rice.edu
Frank Jones	fjones@rice.edu
Stephen Semmes	semmes@rice.edu
Stephen Wang	sswang@rice.edu

### Minor Advisors

Zhiyong Gao	zgao@rice.edu
Frank Jones	fjones@rice.edu
Stephen Semmes	semmes@rice.edu

### Calculus Coordinator

Stephen Wang	sswang@rice.edu
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### Transfer credit

Frank Jones	fjones@rice.edu
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## NEUROSCIENCE

Janet Braam	braam@rice.edu
James McNew	mcnew@rice.edu
Simon Fischer-Baum	simon.j.fischer-baum@rice.edu
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## PHYSICS AND ASTRONOMY

### Astronomy/Astrophysics

Patrick Hartigan	hartigan@rice.edu
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### General Physics

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Paul Padley	padley@rice.edu

### Chemical Physics

Jason Hafner	hafner@rice.edu
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### Applied Physics

Douglas Natelson	natelson@rice.edu
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### Biophysics

Ching-Hwa Kiang	chkhang@rice.edu
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### Computational Physics

Frank Toffoletto	toffo@rice.edu
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### Transfer Credit

Patrick Hartigan	hartigan@rice.edu (Astronomy)
Stan Dodds	dodds@rice.edu (Physics)