

# 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.**





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# 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

| 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 |

#### SPRING

| 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   |
| <br>                  |   |
| BIOC 201              | Introductory Biology  |
| BIOC 301              | Biochemistry I  |
| BIOC 341              | Cell Biology  |
| <br>                  |   |
| BIOC 302              | Biochemistry II   |
| BIOC 344              | Molecular Biology and Genetics                                |
| BIOC 352*             | Physical Chemistry for the Biosciences                        |
| <br>                  |   |
| 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                                    |
| <br>                           |  |
| BIOC 201                       | Introductory Biology I                               |
| EBIO 202                       | Introductory Biology II                              |
| EBIO 325                       | Ecology  |
| EBIO 334/BIOC 334              | Evolution  |
| <br>                           |  |
| BIOC 211                       | Intermediate Experimental Biosciences                |
| EBIO 213                       | Introductory Lab in Ecology and Evolutionary Biology |
| <br>                           |  |
| 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<br>or EBIO 338 | Differential Equations or Biological Statistics or Design<br>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 |
|----------|--------------|

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.

| <b>FALL</b>      |                                      |                   | <b>SPRING</b>    |                                     |                   |
|------------------|--------------------------------------|-------------------|------------------|-------------------------------------|-------------------|
| <b>FRESHMAN</b>  |                                      | <b>17 credits</b> | <b>FRESHMAN</b>  |                                     | <b>15 credits</b> |
| 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                 |
| <b>SOPHOMORE</b> |                                      | <b>15 credits</b> | <b>SOPHOMORE</b> |                                     | <b>14 credits</b> |
| 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                 |                  |                                     |                   |
| <b>JUNIOR</b>    |                                      | <b>17 credits</b> | <b>JUNIOR</b>    |                                     | <b>14 credits</b> |
| 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                 |                  |                                     |                   |
| <b>SENIOR</b>    |                                      | <b>15 credits</b> | <b>SENIOR</b>    |                                     | <b>15 credits</b> |
| 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<br><i>or</i> Mechanics (with lab)                         |
| PHYS 102/104 <i>or</i> PHYS 112 | Electricity & Magnetism (with lab) and E&M Discussion<br><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<br><i>or</i> Honors Calculus II |

|                             |   |
|-----------------------------|---|
| MATH 212 <i>or</i> MATH 222 | Multivariable Calculus <i>or</i> Honors Calculus IV |
|-----------------------------|---|

*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<br><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)<br><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   |                                      |   | FRESHMAN   |                                    |   |
|------------|--------------------------------------|---|------------|------------------------------------|---|
| 15 credits |                                      |   | 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  |                                 |   | SOPHOMORE  |                                     |   |
|------------|---------------------------------|---|------------|-------------------------------------|---|
| 17 credits |                                 |   | 15 credits |                                     |   |
| CHEM 211   | Organic Chemistry I             | 3 | CHEM 215   | Organic Chemistry Lab               | 2 |
| CHEM 213   | Organic Chemistry Discussion    | 0 | CHEM 360   | Inorganic Chemistry                 | 3 |
| 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     |                             |   | JUNIOR     |                              |   |
|------------|-----------------------------|---|------------|------------------------------|---|
| 18 credits |                             |   | 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        |                               |   | SENIOR        |  |   |
|---------------|-------------------------------|---|---------------|--|---|
| 17 credits    |                               |   | 17 credits    |  |   |
| CHEM 430      | Quantum Chemistry             | 3 | MATH/<br>CAAM | 300+ level Elective                    | 3 |
| CHEM 492      | Undergraduate Honors Research | 5 | CHEM 493      | Undergraduate Honors Research          | 5 |
| MATH/<br>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

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## 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 or PHYS 111 | Mechanics (with lab) and Mechanics Discussion or Mechanics (with lab)                           |
| PHYS 102/104 or PHYS 112 | Electricity & Magnetism (with lab) and E & M Discussion or 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 or CAAM 210 | Computation in Natural Science or Introduction to Engineering Computation  |
| ESCI 412 or ESCI 430 | Advanced Petrology or 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) |
|----------|---|

*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 |                                      | 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 |                                 | 17 credits | SOPHOMORE |                                    | 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  | <i>Differential Equations</i>   | 3          | DIST      | Distribution Course                | 3          |
| DIST      | Distribution Course             | 3          | DIST      | Distribution Course                | 3          |
| OPEN      | Open Elective                   | 3          | OPEN      | Open Elective                      | 3          |

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

| JUNIOR   | SUMMER                    | 3 credits |
|----------|---------------------------|-----------|
| ESCI 390 | <i>Geology Field Camp</i> | 3         |

| SENIOR   |                         | 16 credits | SENIOR   |                                       | 15 credits |
|----------|-------------------------|------------|----------|---------------------------------------|------------|
| ESCI 463 | <i>Tectonic Systems</i> | 4          | ESCI 427 | <i>Sequence Stratigraphy</i>          | 3          |
| DIST     | Distribution Course     | 3          | ESCI 506 | <i>Carbonate Depositional Systems</i> | 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  
GLHT 360

Bioengineering for Global Health Environments  
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  
MATH 102

Single Variable Calculus I  
Single Variable Calculus II

*One course from:*

MATH 211  
MATH 381  
MATH 423/CAAM 423

Ordinary Differential Equations and Linear Algebra  
Intro to Partial Differential Equations  
Partial Differential Equations I

*One to two courses from:*

MATH 212  
MATH 221 *and* 222

Multivariable Calculus  
Honors Calculus III *and* IV

*One course from:*

MATH 221  
MATH 354  
MATH 355

Honors Calculus III  
Honors Linear Algebra  
Linear Algebra

*Two courses from:*

MATH 321  
MATH 322  
MATH 425

Intro to Analysis I  
Intro to Analysis II  
Integration Theory

MATH 356  
MATH 463

Abstract Algebra I  
Abstract Algebra II

*One course from:*

MATH 370  
MATH 401  
MATH 402

Calculus on Manifolds  
Differential Geometry  
Differential Geometry

*One course from:*

MATH 382  
MATH 427

Complex Analysis  
Complex Analysis

*One course from:*

MATH 443  
MATH 444  
MATH 445

General Topology  
Geometric Topology  
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><br>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><br>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><br>Mechanics (with lab)                             |
| PHYS 102/104 <i>or</i> 112 | Electricity and Magnetism (with lab) and E & M Discussion <i>or</i><br>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<br>Mechanics (with lab)                             |
| PHYS 102/104 or 112 | Electricity and Magnetism (with Lab) and E & M Discussion or<br>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<br>Mechanics (with lab)                             |
| PHYS 102/104 or 112        | Electricity and Magnetism (with lab) and E & M Discussion or<br>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

---

## 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 |
|----------------|-------------------|

#### Transfer Credit

|               |                   |
|---------------|-------------------|
| Dave Caprette | caprette@rice.edu |
|---------------|-------------------|

### 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 |
|---------------|------------------------|

## 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>    | Lesya Tran          | lesya@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 |
|-------------|-----------------|



# Major Advisors

---

## 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

---

## 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 |
|--------------|-----------------|

### Transfer credit

|             |                 |
|-------------|-----------------|
| Frank Jones | fjones@rice.edu |
|-------------|-----------------|

## NEUROSCIENCE

|                    |                               |
|--------------------|-------------------------------|
| Janet Braam        | braam@rice.edu                |
| James McNew        | mcnew@rice.edu                |
| Simon Fischer-Baum | simon.j.fischer-baum@rice.edu |
| David Dickman      | david.dickman@rice.edu        |

## PHYSICS AND ASTRONOMY

### Astronomy/Astrophysics

|                         |                   |
|-------------------------|-------------------|
| Patrick Hartigan        | hartigan@rice.edu |
| Christopher Johns-Krull | cmj@rice.edu      |

### General Physics

|             |                 |
|-------------|-----------------|
| Stan Dodds  | dodds@rice.edu  |
| Paul Padley | padley@rice.edu |

### Chemical Physics

|              |                 |
|--------------|-----------------|
| Jason Hafner | hafner@rice.edu |
|--------------|-----------------|

### Applied Physics

|                  |                   |
|------------------|-------------------|
| Douglas Natelson | natelson@rice.edu |
|------------------|-------------------|

### Biophysics

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### Computational Physics

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

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