Undergraduate Advising Information (2017-2018)

Packet Contents:

Introduction to the Degree Programs in BioSciences ................................................................. 2
BioSciences Advisors ......................................................................................................................... 3
Getting Started in BioSciences ......................................................................................................... 4
BioSciences Courses Accessible to Freshmen ............................................................................... 5
Comparison of BioSciences Majors and Minors .............................................................................. 7
Undergraduate Research in BioSciences ........................................................................................ 12
Finding and Securing Research Opportunities ............................................................................... 13
Frequently Asked Questions and Tips for Planning Your Major ..................................................... 14

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Website: http://biosciences.rice.edu (advising/courses/majors/research information can be found here)
OwlSpace: https://owlspace-ccm.rice.edu/portal (log on and join “BioSciences Opportunities”)
Facebook: https://www.facebook.com/BioSciencesatRice

The BioSciences department unites faculty engaged in research and teaching in a wide range of disciplines within the life sciences, creating a vibrant and diverse community of scholars. The department offers undergraduate degrees in Biochemistry and Cell Biology (BA, BS), Biological Sciences (BA), Ecology and Evolutionary Biology (BA, BS), and Environmental Science (BA, BS) as well as minors in these areas and in Neuroscience. The BA degrees offer a rigorous biological curriculum suitable for a large number of career paths yet allow the flexibility for academic exploration outside of biology. The BS degrees offer greater depth in upper-level coursework and/or more intense independent research experiences and are often chosen by students planning to pursue an advanced degree in the life sciences. BioSciences undergraduate students of all majors are welcome and encouraged to participate in research, availing themselves of the numerous independent research opportunities at Rice and at partner institutions in the Houston community.
Getting Started — Introduction to the Degree Programs in BioSciences

The Department of BioSciences offers a broad range of courses across the biological sciences, and students may choose from a variety of degree programs:

**The Biological Sciences BA** degree incorporates elements of the Ecology and Evolutionary Biology (EBIO) and the Biochemistry & Cell Biology (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 biological interests. As the Biological Sciences BA combines coursework from both BIOC and EBIO programs, this major may not be combined with any other BioSciences degree (i.e., BS, BA or Minor in Ecology & Evolutionary Biology or BS, BA or Minor in Biochemistry & Cell Biology).

**The Biochemistry & Cell Biology BS and BA** degree paths are designed for students pursuing a wide range of careers in the life sciences, typically leading to graduate, medical, or other professional schools. Both paths are designed to emphasize a broad understanding of cell biology and biochemistry, provide room for exploration anywhere in the Natural Sciences or Engineering, and culminate in one (BA) or two (BS) required 400-level capstone courses incorporating primary scientific literature, presentations, and writing. The BA offers greater flexibility with two fewer courses (including a choice of 300-level core courses). The BS offers greater coverage and depth, with a complete 300-level core and an additional 400-level capstone course.

**The Ecology & Evolutionary Biology BS and BA** degree paths are designed to educate the next generation of scientists and environmental citizens through coursework that involves hands-on, local, and applied learning opportunities as well as experiences in overseas settings. These degree paths provide students with the flexibility to specialize in particular sub-disciplines through their coursework, independent study, and/or research opportunities, both within our department and with our colleagues in other departments and institutions. The BA is appropriate for students planning to pursue either graduate or professional degrees and is well-suited for students with an additional major that is not in the sciences. The BS requires independent research under the supervision of a BioSciences faculty member culminating in an original thesis and is designed to facilitate advanced studies.

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

**The Minors in Biochemistry & Cell Biology, Ecology & Evolutionary Biology, Environmental Science, or Neurobiology** are intended for those with an interest in the life sciences but who may be majoring in other areas. The minor in Biochemistry & Cell Biology incorporates many of the life science core courses required for the health professions.
BioSciences Advisors
(Advisor photos are in order of their first contact listing below)

Advisors for Prospective Students, Freshmen, and Undeclared Sophomores:
These advisors communicate with incoming students and advise freshmen and sophomores formally and informally. They are here to assist prospective majors and others, including premedical students who need specific information about our programs, lecture courses, and laboratory courses. (Note: All BioSciences advisors can provide information on Biological Sciences BA degree).

Dr. Beth Beason-Abmayr (BIOC Degrees): 326 Anderson Biological Labs; x2535; bbeason@rice.edu
Dr. Matthew Bennett, (BIOC Degrees): 306 Keck Hall; x4161; matthew.bennett@rice.edu
Dr. Jamie Catanese (BIOC Degrees): 130C Anderson Biological Labs; x2391; djc98@rice.edu
Dr. Scott Egan (EBIO Degrees): 103A Anderson Biological Labs; x4913/2334; Scott.P.Egan@rice.edu
Dr. Liz Eich (BIOC Degrees) (QEP Quality Enhancement): 342 Anderson Biological Labs; x6144; lizmc@rice.edu
Dr. Kathleen Matthews (BIOC Degrees): 203 Keck Hall; x4871; ksm@rice.edu
Dr. Alma Novotny (BIOC Degrees): W105 George R. Brown Hall; x4015; novotnya@rice.edu
Dr. Dereth Phillips (BIOC Degrees): 340 Anderson Biological Labs; x2343; derethp@rice.edu
Dr. Scott Solomon (EBIO Degrees): 130D Anderson Biological Labs; x2661; scott.solomon@rice.edu

Advisors for Declaring or Declared BIOC Majors (advisors are assigned by first letter of your last name):
Dr. Kate Beckingham: W130 George Brown Hall; x4016; kate@rice.edu (names beginning with A-H)
Dr. Dave Caprette: 327 Anderson Biological Labs; x3498; caprette@rice.edu (names beginning with I-P)
Dr. Charles Stewart: W104 George Brown Hall; x4926, crs@rice.edu (names beginning with Q-Z)

Advisors for Declaring or Declared EBIO Majors:
Dr. Adrienne M. S. Correa: 201D Anderson Biological Labs; x3054; ac53@rice.edu
Dr. Scott Solomon: 130D Anderson Biological Labs; x2661; scott.solomon@rice.edu

Advisor for Declaring or Declared ENSCI Majors (including transfer credit):
Dr. Amy Dunham: 103B Anderson Biological Labs; x2792; aed4@rice.edu

Advisors for Neuroscience Program (including transfer credit):
Dr. Dave Caprette: 327 Anderson Biological Labs; x3498; caprette@rice.edu
Dr. James McNee: 713 BioSciences Research Collaborative; x3133; mcnew@rice.edu

Advisors for Transfer Credit:
For specific BIOC course credit or generic BIOC transfer credit, contact Dr. Dave Caprette (see contact info above)
For specific EBIO course credit or generic EBIO transfer credit, contact Dr. Scott Solomon (see contact info above)
For Study Abroad transfer credit for BIOC, contact Dr. George Bennett: 813 BRC; x4920; gbennett@rice.edu.
For Study Aboard transfer credit for EBIO, contact Dr. Scott Solomon (see contact info above)

BIOS Undergraduate Program Coordinator:
Pedro Muniz; GRB W132; x4207; pedro.muniz@rice.edu
Getting Started in BioSciences

Courses to take first:
The following fundamental courses are required for BioSciences upper level offerings and must be taken as prerequisites for most advanced courses. For this reason, it is important for all BioSciences majors to take the following courses during their first year (or transfer in AP credit for them):

- **BIOC 201**: Introductory Biology lecture
- **BIOC 112 or NSCI 120**, Introductory Labs (recommended, not required)
- **CHEM 121/123**: General Chemistry and lab (and for BIOC and BIOS majors or minors CHEM 122/124)

First year Biological Sciences, Ecology & Evolutionary Biology, or Environmental Sciences majors, also need to take:

- **EBIO 202**: Introductory Biology II lecture
- **EBIO 213**: Introductory Lab in EBIO (can be concurrent with BIOC 211 if class/laboratory times are not in conflict)

**AP Credit….to take or not to take:** If you have AP credit, think about whether you feel confident and wish to take next steps or would benefit from taking the introductory courses (BIOC 201 and/or EBIO 202). See the information on “BioSciences Courses Accessible to Freshmen (p. 5)” to view courses you can take your freshman year if you have AP for required courses. BIOC 300 is designed as a next step for students with AP credit to prepare them for upper-level BIOC courses (see details on p. 6).

Consult an advisor if you feel uncertain!!!

Undergraduate Research Opportunities

*Start planning now!*

Undergraduate research opportunities are available and highly encouraged as an important part of a thorough education in the biological sciences. Undergraduates may begin their research experience as early as their freshman year by finding and securing a research position on a volunteer basis, for pay, or for credit through the courses BIOC 310 (www.bioc.rice.edu/bioc310) or EBIO 306. Be aware that prospective research advisors often prefer students who can demonstrate competence either through prior experience or completion of a teaching laboratory course. BIOC 112, NSCI 120, or BIOC 211 can serve as a prerequisite for BIOC 310 research, whereas BIOC 112 or 211 and EBIO 213 are preferred for EBIO 306 (see Finding Research Opportunities).

BioSciences Opportunities OwlSpace List

*Join now for departmental information and research opportunities!*

On this “joinable” site we post BioSciences departmental information and various biology-related opportunities that we encounter. Examples include: Information sessions, research opportunities, summer internship programs, fellowships, jobs, study abroad, *etc.* This site and mailing list is a great way to join the BioSciences team and to hear about biological and biomedical research opportunities on and off the Rice campus. To join the list and view previous posts, log on to [http://owlspace-ccm.rice.edu](http://owlspace-ccm.rice.edu) using your net ID and password. Go to “My Workspace”/“Membership”/“Joinable Sites”, search the list and select “BioSciences Opportunities.”
BioSciences Courses Accessible to Freshmen

LABORATORY COURSES:

Optional BIOC Laboratories for Freshmen: BIOC 112 or NSCI 120
These optional labs focus on fundamental research skills and prepare students for research experiences before completing BIOC 211; these courses are recommended for students with limited laboratory experience but are not required. A student may receive credit for BIOC 112 (1 credit hour) or NSCI 120 (3 credit hours), but not for both courses. NSCI 120 (3 credit hours) fulfills the biology laboratory requirement for medical school applications. AP credit is not accepted for biology laboratory courses.

BIOC 112 Introductory Biological Research Challenges (offered Fall and Spring, 1 credit hour)
Teams of students work on investigative, client-based projects with opportunities to design experiments, analyze data, and communicate their findings. This course is recommended for students interested in a BioSciences major who have very limited practical laboratory experience. Only first year students may enroll.

NSCI 120 Introduction to Scientific Research Challenges (offered Fall and Spring, 3 credit hours)
Students in NSCI 120 will solve client-based problems that require the discovery or application of scientific knowledge, specifically in the fields of biology and chemistry. Students will work in interdisciplinary teams and be involved in shaping their project and implementing the scientific method to find solutions. This course is limited to first year students only.

Required Intermediate Level Laboratories: BIOC 211 and EBIO 213

BIOC 211 Intermediate Experimental Biosciences (offered Fall and Spring, 2 credit hours)
This course is a required intermediate level laboratory experience designed for BioSciences majors. Freshmen students wishing to take a laboratory should take BIOC 112 or NSCI 120. BIOC 211 is not available to first year students without instructor permission.

EBIO 213 Intro Lab Module in Ecology and Evolutionary Biology (offered Fall & Spring, 2 credit hours)
This course, required for EBIO and Biological Sciences majors, features experimental, laboratory, and field studies of natural history, ecology, evolution, and animal behavior. EBIO 213 meets during the second half of the semester only. (BIOC 211 and EBIO 213 can be taken concurrently if class times do not conflict).

FRESHMAN SEMINARS (offered Fall and Spring, 1 credit hour):

BIOC 115/FSEM 115 Freshman Seminar in Local Biology Research
EBIO 116/FSEM 116 Freshman Biology Seminar
ENST 117 Freshman Seminar in Local Environment Science Research
These half-semester seminar courses introduce freshmen interested in biology to the excitement of research at Rice and across Houston. Small groups will meet weekly with a graduate student or postdoctoral researcher to explore a published research article by a local lab, gaining background information about the subject and exposure to the research techniques. Students will meet researchers and tour labs at Rice and elsewhere in the Houston research community. All first-year, non-transfer students are eligible to enroll. EBIO 116 meets in the first half of each semester, and BIOC 115 and ENST 117 meet in the second half of each semester (www.bioc.rice.edu/bioc115/).

LECTURE COURSES:

BIOC 201 Introductory Biology (offered Fall and Spring, 3 credit hours)
An introductory course featuring topics that include chemistry and energetics, cell physiology, cell biology, Mendelian genetics, molecular genetics, developmental biology, and plant physiology.

EBIO 202 Introductory Biology II (offered Spring only, 3 credit hours)
The second in a series of two introductory biology courses (BIOC 201, EBIO 202). This course examines the diversity of life, comparative animal physiology, evolution, ecology, and conservation. An emphasis is placed on evolution as a central framework necessary for a complete understanding of modern biology. Group discussions allow students to explore topics in more detail and discover how they are relevant to our everyday lives. Prerequisite: BIOC 201.
EBIO 270 Ecosystem Management (offered Spring only, 1 credit hour)
This course focuses on applied ecosystem topics, including relations with state and federal agencies, field studies, wetland delineations, permitting compliance, and environmental regulations.

BIOC 300 Paradigms in Biochemistry and Cell Biology (offered Fall only, 3 credit hours)
Designed for BIOC majors and minors and recommended strongly for students with Advanced Placement in Biology who do not take BIOC 201 and for students wanting additional foundation before transitioning to the other 300-level BIOC courses. BIOC 201 examines a broader range of biological sciences, whereas BIOC 300 examines paradigms in biochemistry and cell biology with a specific focus on the “central dogma” of molecular biology and utilizes both historic and contemporary research papers. Using a newly designed “flipped” format, lectures will be available on-line, and in-class activities will address confusions/questions, examine research articles, explore cases and problems, and engage students in short writing assignments. Note that BIOC 300 may be offered in a summer session.

BIOC 335 Cellular and Molecular Animal Physiology (offered Spring only, 3 credit hours)
This course takes a functional approach to investigate animal physiology from a cellular and molecular perspective. Using an integrated and comparative approach, students learn how animals maintain homeostasis, including how they meet their energy needs, take up and transport oxygen, and maintain hydration and salt balance. Students will read primary literature to explore physiological adaptations for survival in extreme environments. Prerequisite: BIOC 201.

Upper Level Required Courses
Two upper level courses — BIOC 341 Cell Biology and BIOC 344 Molecular Biology & Genetics — can be considered by students with a strong background in biology. A conversation with the instructor prior to enrolling is advised.

NOTE: Be sure to check the course offerings on the Registrar’s web page to confirm availability of courses.
BIOSciences at Rice

Majors and minors for those interested in living systems:

Biological Sciences (BIOL SCI) (BA major only)
This degree program blends biochemistry & cell biology and ecology & evolutionary biology courses and laboratories, providing a unique integration of molecular, cellular, organismal, environmental, and ecological approaches to living systems.

Biochemistry & Cell Biology (BIOC) (BA, BS, minor)
The degree programs in BIOC focus on molecules to organisms using a diversity of approaches — biochemical, biophysical, molecular biological, genetic, computational — to explore the function of living organisms. NOTE: A BA/MA/PhD track is offered for BIOC; for more information, talk to an academic advisor.

Ecology & Evolutionary Biology (EBIO) (BA, BS, minor)
The degree programs in EBIO focus on organisms to communities and their environmental context using a wide range of methods — from ecological to evolutionary, including genetic approaches, computational modeling, and population analysis — to explore living systems from organisms to the extended environment.

Environmental Science (ENSC/ENST) (BA, BS, minor in ENST)
The degree programs in ENSC/ENST focus on the interconnection between humans and the natural environment from the perspective of multiple disciplines — biosciences, Earth sciences, civil engineering, humanities, and social sciences.

Neuroscience (NEUR) (minor)
The minor in NEUR exposes students to contemporary neuroscience as an interdisciplinary field that encompasses a broad range of knowledge from the natural and social sciences to humanities and engineering.
## REQUIREMENTS FOR MAJORS AND MINORS IN BIOSCIENCES: Biochemistry & Cell Biology, Ecology & Evolutionary Biology, Biological Sciences**

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<thead>
<tr>
<th>Category</th>
<th>BA BIOC</th>
<th>BS BIOC</th>
<th>BA Biol</th>
<th>BA EBIO</th>
<th>BS EBIO</th>
<th>BIOC-Minor</th>
<th>EBIO-Minor</th>
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<tr>
<td><strong>Math/Stat</strong></td>
<td>MATH 101/102, or listed substitutions (see lists next page) MATH 211</td>
<td>MATH 101/102, or listed substitutions (see lists next page) MATH 211</td>
<td>MATH 101/102, or listed substitutions MATH 211, or STAT 305, or EBIO 338</td>
<td>MATH 101/102, or listed substitutions EBIO 338, or STAT (≥ 3 credits)</td>
<td>MATH 101/102, or listed substitutions EBIO 338, or STAT (≥ 3 credits)</td>
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<td><strong>Physics</strong></td>
<td>PHYS 125/126, or listed substitutions</td>
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<td><strong>Intro Chem</strong></td>
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<td><strong>Orgo Chem</strong></td>
<td>CHEM 211/213, CHEM 212/214, 215, or listed substitutions</td>
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<td><strong>Intro Bio Labs</strong></td>
<td>BIOC 201</td>
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<td><strong>Adv Labs</strong></td>
<td>BIOC 311, 2 BIOC labs ≥ 300 level</td>
<td>BIOC 311, 2 BIOC labs ≥ 300 level</td>
<td>3 EBIO/EBIO 300/400 Labs</td>
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<td><strong>Upper Level Lecture Courses in Major Area</strong> (≥ 3 credit hours)</td>
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<td><strong>Broadening Upper Level Lecture Courses</strong></td>
<td>2 NSCI/ENGI ≥ 300 (≥ 3 credit hours)</td>
<td>2 NSCI/ENGI ≥ 300 (≥ 3 credit hours)</td>
<td>1 NSCI/ENGI &gt;300 (≥ 3 credit hours)</td>
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<td><strong>Senior Capstone</strong></td>
<td>1 BIOC 400 level (≥ 3 credit hours)</td>
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**NOTE:** This document was created to simplify, but not supersede, information found in the General Announcements. In the event of discrepancies, the General Announcements are to be considered the final authority on the requirements of the various majors offered in BioSciences.
**BIOC Majors (BA or BS) and BIOC Minors additional notes**

**Permissible substitutions:** MATH 111 and 112 may be substituted for MATH 101; CHEM 151/153 and CHEM 152/154 may be substituted for CHEM 121/123 and CHEM 122/124; CHEM 320 may be substituted for CHEM 212; CHEM 365 may be substituted for CHEM 215; PHYS 101/103 and PHYS 102/104 or PHYS 111 and PHYS 112 may be substituted for PHYS 125 and 126; CHEM 311 and 312 may substitute for BIOC 352. A maximum of 3 credit hours from BIOC 390 (transfer credit in Biochemistry and Cell Biology) may be applied to elective NSCI/ENGI lecture requirements.

**Research courses and laboratory requirements:** BIOC majors (BA and BS) must take BIOC 311 and at least one of the additional advanced laboratory courses other than a research for credit course. If desired, the third advanced laboratory requirement may be satisfied by completing: (i) BIOC 310 if taken for at least 3 credits; or (ii) honors research (BIOC 401/402/412). This substitution may be used only once regardless of the number of semesters of independent research taken.

**EBIO majors (BA or BS) additional notes**

**Acceptable substitutions:** Permissible substitutions: MATH 111 and MATH 112 may be substituted for MATH 101; CHEM 151/153 may be substituted for CHEM 121/123; PHYS 101/103 or PHYS 111 may be substituted for PHYS 125.

**Research courses and laboratory requirements:** All EBIO majors (BA and BS) must take at least two advanced labs (300/400-level). EBIO BA degree students may substitute EBIO 306 (taken for at least two credit hours) for one of their advanced laboratory requirements. This substitution may not be used by students completing the BS in EBIO because the independent research courses, EBIO 306, 403, and 404 are requirements of the EBIO BS degree in addition to the two advanced labs.

**Biological Sciences (BA) additional notes**

**Acceptable substitutions:** MATH 111 and MATH 112 may be substituted for MATH 101; CHEM 151/153 and CHEM 152/154 may be substituted for CHEM 121/123 and CHEM 122/124; CHEM 320 may be substituted for CHEM 212; CHEM 365 may be substituted for CHEM 215; PHYS 101/103 and PHYS 102/104 or PHYS 111 and PHYS 112 may be substituted for PHYS 125 and 126. CHEM 311 and 312 may substitute for BIOC 352. A maximum of 3 credits of transfer credit (BIOC 390 or EBIO 391) can apply to this major.

**Research courses and laboratory requirements:** Only one of the three advanced laboratory requirements may be satisfied by taking any of the following: (i) BIOC 310 for at least 3 credits or EBIO 306 if taken for at least 2 credits; (ii) BIOC 401/402/412 or EBIO 403/404, or (iii) BIOC/EBIO 393 (laboratory transfer credit). This substitution may be used only once regardless of the number of semesters of independent research or transfer credit.

**This document was created to simplify, but not supersede, the more complete information found in the General Announcements. In the event of discrepancies, the General Announcements are to be considered the final authority on the requirements of the various majors offered in BioSciences.**
# REQUIREMENTS FOR ENVIRONMENTAL SCIENCE B.S., B.A., AND MINOR**

<table>
<thead>
<tr>
<th>Category</th>
<th>B. A. in Environmental Science</th>
<th>B.S. in Environmental Science</th>
<th>Environmental Studies Minor</th>
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<tr>
<td><strong>General Prerequisites</strong></td>
<td>BIOC 201, EBIO 202</td>
<td>BIOC 201, EBIO 202</td>
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<td>MATH 101/102 or substitution</td>
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<td>STAT 280 or STAT 305</td>
<td>PHYS 101/103 or PHYS 111 (with lab) or PHYS 125 (with lab)</td>
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<td><strong>Core Required Courses</strong></td>
<td>ENST 100/ARCH 105, ESCI 115, ESCI 107 (or 109 or 201), EBIO 213, EBIO 325, ENST 4XX SEMINAR</td>
<td>ENST 100/ARCH 105, ESCI 115, ESCI 107 (or 109 or 201), EBIO 213, EBIO 325, ENST 4XX SEMINAR</td>
<td>Introductory courses (one): EBIO 124, ESCI 101, ESCI 107, ESCI 109, ESCI 201</td>
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<td><strong>Field Experience</strong></td>
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<td>2-3 credit hours of field experience: see GA for list of approved courses</td>
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<td><strong>Major Concentration in Ecology &amp; Evolutionary Biology</strong></td>
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<td>Two courses from: EBIO 270, EBIO/ENST 323, EBIO 372</td>
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<td><strong>Advanced Electives</strong></td>
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<td>One course from each of the following categories:</td>
<td>Two courses from each of the following categories:</td>
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</tr>
<tr>
<td><strong>Capstone Requirement</strong></td>
<td>Independent Research encouraged</td>
<td>One course from the following: ESCI 390, ESCI 391, EBIO 403 or 404, ESCI 481</td>
<td></td>
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</tbody>
</table>

**This document was created to simplify, but not supersede, information found in the GA (General Announcements). In the event of discrepancies, the General Announcements are to be considered the final authority on the requirements of the various majors offered in BioSciences.**
# REQUIREMENTS FOR NEUROSCIENCE MINOR**

<table>
<thead>
<tr>
<th>Category</th>
<th>Neuroscience Minor</th>
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<tr>
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<tr>
<td>Track Requirements</td>
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</tr>
</tbody>
</table>

**This document was created to simplify, but not supersede, information found in the General Announcements. In the event of discrepancies, the General Announcements are to be considered the final authority on the requirements of the various majors offered in BioSciences.
Undergraduate Research in BioSciences

Undergraduate research is an important component of the BioSciences programs, and, while not required for the major, undergraduate research can enhance the undergraduate experience and provide opportunities for career development. Research experience is becoming a critical element for admission to professional schools and is particularly important for those applying for biological graduate programs or intending to go directly into industry research labs. The undergraduate research programs in BioSciences have been designed to flow from observation through participation. Students are encouraged to seek undergraduate research opportunities whenever they are ready. Freshmen seminars (BIOC 115, EBIO 116, ENST 117) and laboratory fundamentals courses (BIOC 112, NSCI 120 & EBIO 213) are designed to provide students in each major with the exposure and basic skills to navigate early entry into labs. **The following courses offer opportunities to experience and participate in active research programs at Rice and, for some, in the Texas Medical Center, Houston Zoo, Houston Museum of Natural Science, Houston Arboretum and Nature Center, Flower Garden Banks National Marine Sanctuary NOAA Office (Galveston), and other off-campus research sites.**

**BIOC 115/FSEM 115 Freshman Seminar in Local Biology Research**  
**EBIO 116/FSEM 116 Freshman Biology Seminar**  
**ENST 117 Freshman Seminar in Local Environmental Science Research**  
These half-semester seminar courses introduce freshmen interested in biology to the excitement of research at Rice and across Houston. Small groups meet weekly with a graduate student or postdoctoral researcher to explore a published research article by a local lab, gaining background information about the subject and exposure to the research techniques. At the end of the course, students will meet researchers and tour labs at Rice and elsewhere in the Houston research community. All first-year non-transfer students are eligible to enroll. EBIO 116 meets in the 1st half of each semester and BIOC 115 and ENST 117 meet in the 2nd half of each semester (www.bioc.rice.edu/bioc115/).

**EBIO 306: Independent Research in Ecology & Evolutionary Biology**  
This course provides a program of independent research for students with previous training in the biosciences. Students are generally expected to spend an average of 3 hours per week in the laboratory for each semester hour of credit and to write a research paper. Students taking ≥ 2 hours of credit for this course are encouraged to present their research at the university annual undergraduate symposium in the spring semester. Venues for research are both inside Rice and in the larger Houston community. Permission of the instructor is required. Suggested prerequisite is EBIO 213.

**BIOC 310: Independent Research in Biochemistry & Cell Biology**  
This course is research-for-credit; students perform research for an average of 3 hours per week per credit hour in faculty laboratories in BioSciences at Rice and elsewhere in the Texas Medical Center, prepare a research proposal, weekly reports and a research paper (Fall) or poster (Spring), and receive course credit for their effort. Those intending to participate in BIOC 310 undergraduate research should take BIOC 112 or NSCI 120 or BIOC 211 (with permission). Please read the BIOC 310 manual for complete information and requirements. ([http://www.bioc.rice.edu/bioc310/](http://www.bioc.rice.edu/bioc310/)).

*If intending to pursue research off-campus, please submit an application to the BIOC 310 instructor ([http://www.bioc.rice.edu/bioc310/](http://www.bioc.rice.edu/bioc310/)) at least 3 weeks before the start of the semester for permission to enroll.  
*The BIOC 310 off-campus regulations may be obtained from the BIOC 310 website. Students working off campus may not take BIOC 310 for fewer than 3 credit hours (9 hours of research/week).*

**BIOC 401/402/412: Honors Research in Biochemistry & Cell Biology**  
The Biochemistry & Cell Biology Honors Research Program is a suite of courses offering our seniors and advanced juniors the opportunity to perform a two-semester, individual research project in a research laboratory in biochemistry & cell biology at Rice or elsewhere in the TMC and requires substantial time devoted to the research project (minimum 3 hours per week per credit hour). This immersive program is intended to give a first-hand experience of what a career in research would entail. Students interested in graduate school are strongly encouraged to apply for consideration for honors research. Information and application can be found here: [https://biosciences.rice.edu/Content.aspx?id=2147483811#3](https://biosciences.rice.edu/Content.aspx?id=2147483811#3).

**EBIO 403/404: Senior Research in Ecology & Evolutionary Biology**  
This course for research in EBIO is open only to undergraduate majors during their senior year and requires permission of the research supervisor and chair. Applications are due in April of the previous academic year. Registration for EBIO 403/404 implies a commitment to participate in research for at least 2 semesters.

**BioSciences Opportunities OwlSpace List**  
On this “joinable” site, we post various biology-related opportunities. Examples include: Research opportunities, summer internship programs, information sessions, fellowships, jobs, study abroad, et al. This site/mailing list is a great way to hear about biological and biomedical research opportunities on/off the Rice campus. To join, log on to OwlSpace using your netID and password and go to “My Workspace” -> “Membership” -> “Joinable Sites” and select BioSciences Opportunities.
Finding and Securing Research Opportunities

Biochemistry & Cell Biology undergraduate research contact information:
Dr. Dereth Phillips: BIOC 115 and BIOC 310. Office: 340 Anderson Biological Labs; email: derethp@rice.edu

Ecology & Evolutionary Biology undergraduate research contact information:
Dr. Adrienne M. S. Correa. Office: 201D Anderson Biological Labs; email: ac53@rice.edu
Dr. Scott Solomon. Office: 130D Anderson Biological Labs; email: scott.solomon@rice.edu

Think about the sorts of research that may be of interest to you and talk to students and advisors in that area of research. Explore on your own by searching through different research departments at Rice, at the Texas Medical Center, or in the greater Houston area. You can learn about the research in a particular department by going to the “Faculty” or “People” tab and clicking through the various faculty names and research statements. At the same time, join the “BioSciences Opportunities” Owlspace site to receive information about research opportunities at Rice and elsewhere. When you have found a lab(s) of interest, scan through recent research articles from that lab and contact the professor to express your interest. [If you are a BIOC major, before contacting the professor, it may be helpful to read the BIOC 310 course manual to get a feel for the expectations of an undergraduate researcher (www.bioc.rice.edu/bioc310/)]. Determine the nature of your engagement (volunteer, for pay, for credit, for one semester/summer, for multiple years). If you are interested in receiving credit for your research, contact the instructor of the research-for-credit/independent study course in the appropriate department. Links to the BioSciences Department and to various off-campus departments may be found on the department website in the section “Research and Internships” under “Undergraduate Studies.”

Independent Research in BioSciences and Beyond

Once you have found a research position, you may be eligible to receive course credit in an appropriate department. All of the following courses may be taken by permission only. Please contact the course instructors for additional details and requirements.

- BIOC 310/401/402—BioSciences: Program in Biochemistry & Cell Biology
- EBIO 306/403/404—BioSciences: Program in Ecology & Evolutionary Biology
- BIOE 400/401—Bioengineering
- CHEM 391/491/492/493—Chemistry
- CHBE 499—Chemical & Biomolecular Engineering
- ESCI 481—Earth Science
- KINE/HEAL 495/496—Kinesiology
- NEUR 310/401/402—Neuroscience Program
- UNIV 301—University-wide, zero-credit, for all majors, all types of projects qualify
- HONS 470/471 (RUSP)—University-wide companion course for research in all majors

Find the course number/department that best matches your research interests. Most departments, including those not listed here, have an independent study/research course.

Note for those interested in the health professions: There are many types of research that can improve human health outside of the biological sciences (health disparities, healthcare economics, medical sociology, psychology of addiction, et al.). For the most fulfilling research experience, make sure to pursue the research that most interests you rather than that which you perceive is desired by medical schools.
Frequently Asked Questions and Tips for Planning Your Major

"Is it better to get a BS rather than a BA?" Neither degree is "better" than the other. Graduate schools, medical schools, and employers will look at your overall academic record including performance, research experience, extracurricular activities, etc. You might choose the BA degree because you want to add a double major, for example, or because you want to spend more time on undergraduate research rather than on the extra course work required for the BS.

"I want to earn a BS in BIOC or EBIO and double major in history. Can I do it?" Yes, but because a history major earns a BA degree you would have to meet the requirements for what we call a dual degree. A dual degree is not the same as a double major. You can major in two or more different fields simply by meeting the requirements for both majors provided that the degree earned is either a BA or BS but not both. To earn a dual degree (BA/BS), you must complete the requirements for both majors and complete at least 30 additional semester hours at Rice beyond the hours required for the first degree.

"I will complete all of the requirements for my major, but how can I be sure I have my 60 hours outside the major?" All courses not specifically used to satisfy major requirements count as "outside" the major, even courses taken in the same discipline. For example, if you complete all of the course requirements listed for a BA in BIOC or EBIO and take a couple of extra BIOC or EBIO courses, those courses count toward the additional 60 hours needed.

I have AP Biology credit. Which BIOC/EBIO class should I take next? What class(es) can I take to get a better feel for the major? Even if you receive AP credit for introductory biology (BIOC 201), you should not wait to begin your introductory laboratory sequence (BIOC 112 or NSCI 120 freshmen year and BIOC 211/EBIO 213 sophomore year). BIOC 300 (Paradigms in Biochemistry and Cell Biology) is a 3-credit course designed for first year students with AP biology credit (or who have taken BIOC 201). BIOC 335 (Molecular and Cellular Animal Physiology), EBIO 319 (Tropical Field Biology), and EBIO 320 (Ecology and Conservation of Brazilian Wetlands) are also accessible to freshmen who have credit for BIOC 201 (note that EBIO 319 and 320 are only offered in summer). BIOC 115 and EBIO 116 are 1-credit seminars that introduce students to research and researchers at Rice. With AP credit, some students go straight into upper level courses, although some have reported that these courses are challenging for the first year of college. For more information see “Courses Accessible to Freshmen.”

What’s the difference between BIOC 112, NSCI 120, and BIOC 211? We offer two entry-level laboratory course options — BIOC 112 (1 credit hour) or NSCI 120 (3 credit hours) — to introduce fundamental methods and standard laboratory practices in biosciences. Major objectives are to prepare students who have limited laboratory experience to move on to courses that require more independent learning (including BIOC 211) and to provide students with fundamental skills that are needed to conduct independent study in a research laboratory in BioSciences. BIOC 112 or NSCI 120 should be taken in the first year. Completion of NSCI 120 fulfills the biology laboratory requirement for medical school applications. A student may receive credit for BIOC 112 or NSCI 120, but not for both courses. BIOC 211 (2 credit hours) is an intermediate level laboratory course designed for BioSciences majors in their second year.

Should I take Physics 125/126 or Physics 101/102? Both sequences will fulfill the BIOC and EBIO physics requirements. PHYS 125/126 is intended for biosciences and premedical students; however, if you are also considering a major in engineering or the physical sciences, then you should take the PHYS 101/102 or PHYS 111/112 series, which is required for most engineering and physical sciences majors.

Which 300-level course is best to take first? BIOC 201 provides a broad overview, and BIOC 300 is a great “first” 300-level for BIOC majors. Although not part of the 300-level core, this course counts toward your 300-level BIOC electives (if taken before any other 300-level BIOC course) or toward 300-level NSCI/ENGI electives and provides a strong foundation for other 300-level courses. EBIO majors should consider taking BIOC 201 before EBIO 325 or EBIO 334 as their first 300-level EBIO courses.
Which core 300-level BIOC required course is best to take first — BIOC 341: Cell Biology, BIOC 341: Biochemistry or BIOC 344? Of the two required core courses for the BIOC major (BIOC 301 and BIOC 341), the order in which you take them depends on your preparation and path through the major. BIOC 301 is best taken soon after your organic chemistry experience as it builds on this knowledge. BIOC 344 is accessible to first-year students with a strong biology background.

How do I get involved in research, and can I get BIOC/EBIO credit for this research? If you perform research in a BioSciences faculty lab or perform research off-campus related to cell or molecular biology, biochemistry, structural biology, genetics, ecology, evolution, conservation biology, or other lab or field-based biology you may be able to receive credit for your research (≥3 hours of work in the laboratory are required for 1 hour credit). Tips for finding research positions and opportunities for receiving credit are found on the BioSciences website.

I want to improve my scientific writing skills. Which courses in the BioSciences department have a stronger emphasis on scientific writing? All of our introductory and advanced teaching labs have a focus on improving scientific writing through practice. Many upper-level classes are also designed to hone writing skills. BIOC 300 (Paradigms in Biochemistry & Cell Biology) will give you practice in writing about science. EBIO 412 (Advanced Communication in Biological Sciences), a required capstone course for EBIO majors, focuses on refining communication skills for students that already have a solid foundation of biological knowledge.

I’m a premedical student: Should I plan on getting the BIOC minor since I’ll need to fulfill most of the requirements anyway? Premedical students aren’t required to complete the BIOC minor, but the minor is a good way for non-majors to build a strong science foundation and is one path to completing the Natural Sciences requirements for most medical schools.

What’s the difference between EBIO, Biological Sciences, and BIOC majors? Please examine the respective degree plans for each! In general, BIOC courses feature an exploration of life from the level of the molecule to the level of the organism, whereas EBIO courses tend to start at the level of the organism and explore life through its diversity, environmental interactions, and evolutionary history. The Biological Sciences major combines the approaches of both the BIOC and EBIO majors.

What is the best course schedule (which classes to take when) for someone deciding between Biochemistry & Cell Biology and Bioengineering? The suggested courses for freshmen in BIOE and BIOC are overlapping, but there are additional critical courses to take in your freshman year to keep on track with each major. Both majors suggest strongly that you take General Chemistry and Calculus in your first year, but BIOE freshmen should also take Physics and CAAM 210. BIOC freshmen should take BIOC 201 (Introductory Biology) and may want to take an introductory biology lab (BIO 112 or NSCI 120). Those deciding between the two majors may need to take “all of the above” during the freshman year.

What are some post-graduation options for me if I graduate with a degree in BIOC or EBIO (aside from medical school or graduate school)? You have many options, especially if you are not geographically limited. These include jobs in education, conservation, environmental resource management, biotechnology, science writing, science policy, scientific/medical illustration, forensic science, and many more. For additional ideas, see the following articles:

“Career counseling: 101+ things you can do with a degree in biology”
http://advan.physiology.org/content/31/4/323.full-text.pdf+html

“Positions Available: No Ph.D. Required?”
https://www.sciencemag.org/careers/features/2008/08/positions-available-no-phd-required

“Careers in the Biological Sciences”
http://www.aibs.org/careers/
APPENDIX: Graduation Checklists for Majors and Minors

This section contains graduation checklists for requirements for specific degrees to help students keep track of progress in their chosen minor or major.
Degree Requirements for the Minor in Biochemistry & Cell Biology

The Biochemistry and Cell Biology minor is intended for students with an interest in the life sciences but majoring in other areas. The Biochemistry and Cell Biology minor incorporates many of the life science core requirements required for the health professions. The minor may be combined with any major except those offered by the Department of BioSciences. Details for courses can be found in the *General Announcements*.

Required courses by department

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<th>MATHEMATICS</th>
<th>CHEMISTRY</th>
<th>BIOSCIENCES</th>
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<tr>
<td>102</td>
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<tr>
<td>126, 102, or 111</td>
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<td></td>
<td>215 or 365</td>
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</tbody>
</table>

One BIOC lecture course ≥ 3 cr hrs at the 300 level or higher

Degree Requirements for the Minor in Ecology & Evolutionary Biology

The Ecology & Evolutionary minor is intended for students with an interest in the life sciences but majoring in other areas. The Ecology & Evolutionary Biology minor incorporates a portion of life science core requirements required for the health professions. The minor may be combined with any major except those offered by the Department of BioSciences. Details for courses can be found in the *General Announcements*. A minimum of 7 courses (20 cr. hrs), with 4 courses (12 cr. hrs) at 300 level or above.

Required courses by department

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<tbody>
<tr>
<td>BIOC 201</td>
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<td>EBIO 202</td>
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<tr>
<td>EBIO 213</td>
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<tr>
<td>4 EBIO</td>
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<tr>
<td>Courses at 300 or 400 level</td>
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</table>

Degree Requirements for the Minor in Neuroscience (Natural Sciences & Engineering Specialization)

The Neuroscience minor is directed toward students with an interest in the workings of the brain and has two tracks. The requirements for the Natural Sciences and Engineering track are delineated below. This minor can be combined with any major, including those offered by the Department of BioSciences. A minimum of 6 courses (18 credit hours) are required for the minor, with a minimum of three courses (9 hr) at the 300-level or above. No more than 2 courses can be from study-abroad or transfer credits. Details for courses can be found in the *General Announcements*.

Required courses

<table>
<thead>
<tr>
<th>NEUR 380/PSYC 380/BIOC 380</th>
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<td>NEUR 385/BIOC 385</td>
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<td>3 courses from the list of electives for NSCI/ENGI</td>
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<tr>
<td>One course from the list of electives for HUMA/SOCI</td>
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</tbody>
</table>
Degree Requirements for the B.A. in Biochemistry & Cell Biology

Total hours required

This degree requires a minimum number of 123 credit hours (122 hours if PHYS 101 is taken in place of PHYS 125). This total includes 60 credit hours taken outside the major. The additional 60 hours may include course work in BIOC or other Natural Sciences or Engineering departments provided that the credit is not specifically applied toward the major. More than 123 hours may be required depending on course selection. For example, substituting 3 credit hours of BIOS or BIOC 310 for a 1 credit hour laboratory course increases the required total by 2 credit hours. If BIOC 401/402/412 is taken for a total of 11 credit hours and then used to satisfy requirements for a 1 credit elective lab and a single 400 level elective BIOC course, the total hours required increases by 7.

Required courses by department

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<tr>
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<tr>
<td>126, 102/4, or 112</td>
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</table>

Elective courses

Two courses from the following list:

- BIOC 302, 344, 352

Two elective laboratory courses:

- BIOC 313, 318, 320 (or BIOC 342), 393 (transfer credit must be approved), 413, 415, 530, 532, 533, 535.
- If taken for 3 or more credits, BIOC 310, or HONS 470/471, or BIOC 401/402/412 may be used to satisfy the second elective lab requirement. The research supervisor must be from the BioSciences faculty with research area in Biochemistry & Cell Biology or approved by the Dept. Chair.

*One BIOC 400 level course ≥3 credit hours

**Two additional courses in Natural Sciences or Engineering, 300 level or above and ≥3 credit hours

*Only a course listed at the 400 level can be used to fill this requirement

**Natural Sciences/Engineering includes any 300-level or greater course of at least 3 credit hours from any department in the Wiess School of Natural Sciences (including BioSciences) or George R. Brown School of Engineering except independent research courses such as BIOC 310 or BIOE 400/401, which cannot be used to fulfill this requirement.

Substitutions

1. The combined courses BIOC 401/402/412 are considered a single BIOC 400 level course AND a single lab at 300 level or higher. To count toward the major all three courses must be completed.

2. (CHEM 310) or (CHEM 311 & 312) may be substituted for BIOC 352. Exceptions must be approved by the BioSciences Chair.

Additional notes

Students may receive credit toward the major of a maximum of 3 credits of BIOC 390 (Transfer Credit in Biochemistry & Cell Biology). A student may graduate under the requirements that were in place at the time of matriculation or in the year of graduation; however, requirements cannot be "mixed." A double major including a B.S. and a B.A. is considered a dual degree; to earn a dual degree a student must complete 30 credit hours in addition to the hours required for the primary major.

Appendix - 2
Degree Requirements for the B.S. in Biochemistry & Cell Biology

Total hours required
This degree requires a minimum number of 129 credit hours (128 hours if PHYS 101 is taken in place of PHYS 125). This total includes 60 credit hours taken outside the major. The additional 60 hours may include course work in BIOC or other Natural Sciences or Engineering departments provided that the credit is not specifically applied toward the major. More than 129 hours may be required depending on course selection. For example, substituting 3 credit hours of BIOC 310 for a 1 credit hour laboratory course increases the required total by 2 credit hours. If BIOC401/402/412 is taken for a total of 11 credit hours and then used to satisfy requirements for a 1 credit elective lab and a single 400 level elective BIOC course, the total hours required increases by 7.

Required courses by department

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<td>BIOC 341</td>
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<td>BIOC 344</td>
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<td>BIOC 352</td>
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</table>

Elective courses

**Two elective laboratory courses:** selection

1: All biochemistry & cell biology majors must take at least two additional laboratory courses, at least one of which must be from the following list:
   - BIOC 313, 318, 320 (BIOC 342), 383 (transfer credit must be approved), 413, 415, 530, 532, 533, 535.
   - If taken for 3 or more credits, BIOC 310, or HONS 470/471, or BIOC 401/402/412 may be used to satisfy the second elective lab requirement.
   - The research supervisor must be from the BioSciences faculty with research area in Biochemistry & Cell Biology or approved by the Dept. Chair.

*Two BIOC 400 level courses ≥3 credit hours* selection 1: (selection 2):

**Two additional courses in Natural Sciences or Engineering, 300 level or above and ≥3 credit hours** selection 1: (selection 2):

*Only courses listed at the 400 level can be used to fill this requirement

**Natural Sciences/Engineering includes any 300-level or greater course of at least 3 credit hours from any department in the Wiess School of Natural Sciences (including BioSciences) or George R. Brown School of Engineering except independent research courses such as BIOC 310 or BIOC 400/401, which cannot be used to fulfill this requirement.

Substitutions

1. The combined courses BIOC 401/402/412 are considered a single BIOC 400 level course AND a single lab at 300 level or higher. To count toward the major all three courses must be completed.
2. (CHEM 310) or (CHEM 311 and 312) may be substituted for BIOC 352. Exceptions must be approved by the BioSciences Chair.

Additional notes

Students may receive credit toward the major of a maximum of 3 credits of BIOC 390 (Transfer Credit in Biochemistry & Cell Biology).

A student may graduate under the requirements that were in place at the time of matriculation or in the year of graduation. However, requirements cannot be "mixed."

A double major including a B.S. and a B.A. is considered a dual degree; to earn a dual degree a student must complete 30 credit hours in addition to the hours required for the primary major.
Degree Requirements for the B.A. in Ecology & Evolutionary Biology

The BA degree in Ecology & Evolutionary Biology is intended for students pursuing a wide range of careers in the life sciences. Students graduating with this degree path typically go on to graduate or professional school. Course work emphasizes a broad understanding of basic biology together with in-depth knowledge of ecology and evolutionary biology that culminates in a required capstone 400-level course incorporating primary scientific literature, presentations, and writing in an advanced topic. The BA degree is well suited for students with an additional major outside of the sciences. Students are strongly encouraged to take advantage of study abroad opportunities.

Required courses by department

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<tr>
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<th>CHEMISTRY AND PHYSICS</th>
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</tr>
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<td>MATH 102</td>
<td>CHEM 123 or 153</td>
<td>EBIO 202</td>
</tr>
<tr>
<td>EBIO 339 or STAT (3 cr course)</td>
<td>PHYS 125 or 101/103 or 111</td>
<td>EBIO 325</td>
</tr>
</tbody>
</table>

REQUIRED LABORATORY COURSES

- BIOC 211
- EBIO 213

Two EBIO 300 or 400 level lecture courses, each ≥3 cr. hrs.  
selection 1:  
selection 2:  

One BIOC 300 or 400 level approved lecture course (≥3 credit hours)  
selection:  

One 300 level lab in EBIO  
selection:  

One 300 or 400 level lab in BIOC or EBIO  
selection:  

One ≥300 level NSCI or ENGI course  
selection:  

Additional notes

A maximum of 3 credits of BIOC 390 and 3 credits of EBIO 391 (lecture course transfer credit) can apply to this major. A student may graduate under the requirements that were in place at the time of matriculation or in the year of graduation. However, requirements cannot be “mixed.”
Degree Requirements for the B.S. in Ecology & Evolutionary Biology

The BS degree in Ecology & Evolutionary biology is intended for students pursuing a wide range of careers in the life sciences. Students graduating from either degree path typically go on to graduate or professional school or enter the workforce with the BS as their terminal degree. Course work emphasizes a broad understanding of basic biology together with in-depth knowledge of ecology and evolutionary biology that culminates in a required capstone 400-level course incorporating primary scientific literature, presentations, and writing in an advanced topic. Students pursuing a BS in Ecology and Evolutionary Biology are required to conduct independent research under the supervision or co-supervision of an EEB faculty member (though the research can take place in other locations or institutions such as the laboratories in the Texas Medical Center or at field sites throughout the world). Students in both degree paths are strongly encouraged to take advantage of study abroad opportunities.

Required courses by department

**MATHEMATICS**
- MATH 101 or 111/112
- MATH 102
- EBIO 338 or STAT (3 cr course)

**CHEMISTRY AND PHYSICS**
- CHEM 121 or 151
- CHEM 123 or 153
- PHYS 125 or 101/103 or 111

**BIOSCIENCES**
- BI 201
- EBI 202
- EBI 325
- EBI/EBOC 334
- EBI 412
- EBI 306 (2 credits minimum, RURS)
- EBI 403
- EBI 404

**REQUIRED LABORATORY COURSES**
- BIOC 211
- EBI 213

Two EBI 300 or 400 level lecture courses, each ≥3 cr. hrs.

One BIOC 300 or 400 level approved lecture course (≥3 credit hours)

One 300 level lab in EBI

One 300 or 400 level lab in BIOC or EBI

One ≥300 level NSCI or ENGI course

Additional notes:
A maximum of 3 credits of BIOC 390 and 3 credits of EBI 391 (lecture course transfer credit) can apply to this major. A student may graduate under the requirements that were in place at the time of matriculation or in the year of graduation; however, requirements cannot be "mixed."
Degree Requirements for the B.A. in Biological Sciences

The BA in Biological Sciences incorporates both BIOC and EBIO courses and is closer to a general biology major than any of the other major fields offered by the department of BioSciences. The BA in Biological Sciences may not be combined with any other BioSciences degree (i.e., BA Biochemistry and Cell Biology, BA Ecology and Evolutionary Biology, BS Biochemistry and Cell Biology, BS Ecology and Evolutionary Biology, Minor in Biochemistry and Cell Biology, or Minor in Ecology and Evolutionary Biology).

Total hours required

This degree requires a minimum number of 127 credit hours (126 hours if PHYS 101 is taken in place of PHYS 125). This total includes 60 credit hours taken outside the major. The additional 60 hours may include coursework in BIOC, EBIO, or other Natural Sciences or Engineering departments provided that the credit is not specifically applied toward the major. More than 126 hours may be required depending on course selection. For example, substituting 3 credit hours of BIOS or BIOC 310 for a 1 credit hour laboratory course increases the required total by 2 credit hours. Completing the third MATH requirement using STAT 305 adds a credit hour to the total required. Other course selections may also add to the total needed. To determine total hours needed, simply add up the total credit hours applied to the major and add 60.

Required courses by department

<table>
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<tr>
<th>Mathematics</th>
<th>Chemistry</th>
<th>BioSciences</th>
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<tbody>
<tr>
<td>101 or 111/112</td>
<td>121 or 151</td>
<td>BIOC 201</td>
</tr>
<tr>
<td>102</td>
<td>122 or 152</td>
<td>EBIO 202</td>
</tr>
<tr>
<td>211 OR STAT 305, OR EBIO 338</td>
<td>123 or 153</td>
<td>EBIO 213</td>
</tr>
<tr>
<td>214</td>
<td>124 or 154</td>
<td>EBIO 211</td>
</tr>
<tr>
<td>PHYSICS</td>
<td>211/213</td>
<td>BIOC 301</td>
</tr>
<tr>
<td>112, 101/103, or 111</td>
<td>212 or 320/214</td>
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</tr>
<tr>
<td>126, 102/104, or 112</td>
<td>215 or 365</td>
<td></td>
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</tbody>
</table>

BioSciences elective courses

One course from the following lecture courses:

- BIOC 302, BIOC 341, BIOC 344, BIOC 352

A total of 3 laboratory courses from the following list:

- BIOC 311, 313, 318, 320, 413, 415, 530, 533, 535
- EBIO 316, 317, 319, 320, 324, 327, 330, 332, 335, 337, 367, 368, 379
- BIOC 310 or EBIO 306 if taken for at least 2 credits OR HONS 470/471

NOTE: If pre-approved by the student’s advisor, BIOC 401/402/403 or EBIO 403/404, or BIOC/EBIO 393 transfer credit can be used only once

A total of five EBIO/BIOC courses:

- Three 300 or 400 level BIOC or EBIO level lecture courses, each ≥3 credit hours
  - selection 1:
  - selection 2:
  - selection 3:

- One 300 or 400 level BIOC or EBIO level lecture course (≥3 cr. hrs.)
  - selection 4:

- One additional 300 or 400 level BIOC or EBIO level course ≥3 cr. hrs.
  - selection 5:

*Only one* of the advanced laboratory course requirements can be satisfied by taking any of the following:

- BIOC 310 for EBIO 306 if taken for at least two credits;
- (ii) HONS 470/471, if the research supervisor is from the BioSciences department or if the research is biological in nature and preapproved by the student’s advisor;
- (iii) BIOC 412;
- (iv) BIOC or EBIO 393 (laboratory transfer credit).

**CHEM 310 or CHEM 311 and 312 may be substituted for BIOC 352.**

Additional notes

A maximum of 3 credits of BIOC 390 and 3 credits of EBIO 391 (lecture course transfer credit) can apply to this major. A student may graduate under the requirements that were in place at the time of matriculation or in the year of graduation; however, requirements cannot be "mixed."

Appendix - 6
Degree Requirements for the B.A. in Biological Sciences

The BA in Biological Sciences incorporates both BIOC and EBIO courses and is closer to a general biology major than any of the other major fields offered by the department of BioSciences. The BA in Biological Sciences may not be combined with any other BioSciences degree (i.e., BA Biochemistry and Cell Biology, BA Ecology and Evolutionary Biology, BS Biochemistry and Cell Biology, BS Ecology and Evolutionary Biology, Minor in Biochemistry and Cell Biology, or Minor in Ecology and Evolutionary Biology).

Total hours required

This degree requires a minimum number of 127 credit hours (126 hours if PHYS 101 is taken in place of PHYS 125). This total includes 60 credit hours taken outside the major. The additional 60 hours may include coursework in BIOC, EBIO, or other Natural Sciences or Engineering departments provided that the credit is not specifically applied toward the major. More than 126 hours may be required depending on course selection. For example, substituting 3 credit hours of BIOS or BIOC 310 for a 1 credit hour laboratory course increases the required total by 2 credit hours. Completing the third MATH requirement using STAT 305 adds a credit hour to the total required. Other course selections may also add to the total needed. To determine total hours needed, simply add up the total credit hours applied to the major and add 60.

Required courses by department

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
<th>CHEMISTRY</th>
<th>BIOSCIENCES</th>
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<tr>
<td>101 or 111/112</td>
<td>121 or 151</td>
<td>BIOC 201</td>
</tr>
<tr>
<td>102</td>
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<td>EBIO 202</td>
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<tr>
<td>211 OR STAT 305, OR EBIO 338</td>
<td>123 or 153</td>
<td>BIOC 211</td>
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<tr>
<td>PHYSICS</td>
<td>124 or 154</td>
<td>EBIO 213</td>
</tr>
<tr>
<td>125, 101/103, or 111</td>
<td>211/213</td>
<td>BIOC 301</td>
</tr>
<tr>
<td>126, 102/104, or 112</td>
<td>212 or 320/214</td>
<td></td>
</tr>
<tr>
<td></td>
<td>215 or 365</td>
<td></td>
</tr>
</tbody>
</table>

BioSciences elective courses

One course from the following lecture courses:

- BI O302, BI O341, BI O344, BI O352

A total of 3 laboratory courses from the following list:

- BI OC 311, 313, 318, 320, 413, 415, 530, 532, 533, 535
- E B IO 316, 317, 319, 320, 324, 327, 330, 332, 335, 337, 367, 368, 379

BI OC 310 or EB IO 306 if taken for at least 2 credits OR HONS 470/471

NOTE: If pre-approved by the student’s advisor, BI OC 401/402/403 or EB IO 403/404; or BI OC/EB IO 393 transfer credit can be used only once

A total of five EBIO/BIOC courses:

Three 300 or 400 EBIO level lecture courses, each ≥3 credit hours

One 300 or 400 level BI OC lecture course (≥3 cr. hr.)

One additional 300 or 400 level BI OC or EB IO lecture course (≥3 cr. hrs.)

*Only one of the advanced laboratory course requirements can be satisfied by taking any of the following: BI OC 310 or EB IO 306 if taken for at least two credits; or (ii) HONS 470/471, if the research supervisor is from the BioSciences department or if the research is biological in nature and preapproved by the student's advisor; or (iii) BI OC 412; or (iv) BI OC or EB IO 393 (laboratory transfer credit).

***(CHEM 310) or (CHEM 311 and 312) may be substituted for BI OC 352. Exceptions must be approved by the Department Chair.

Additional notes

A maximum of 3 credits of BI OC 390 and 3 credits of EB IO 391 (lecture course transfer credit) can apply to this major. A student may graduate under the requirements that were in place at the time of matriculation or in the year of graduation; however, requirements cannot be "mixed."

Appendix - 6
Degree Requirements for the B.S. in Environmental Science

The BS in Environmental Science explores the interconnection between humans and the natural environment. Modern environmental issues reflect the complex interactions of natural and social systems at global and local scales, and the resulting impacts on the Earth have led many to ask whether humankind has entered into a new epoch in the planet’s history, one in which humans are now a key driver in the change of Earth systems. The Environmental Science program fosters the critical, integrative thinking required to better understand the complexities of this human-nature relationship and the resultant scales of impact, and to assess and develop solutions that meet intergenerational human needs without compromising the natural systems upon which humans depend.

Total hours required

This degree requires a minimum number of 133 credit hours. This total includes 60 credit hours taken outside the major. The additional 60 hours may include course work in Natural Sciences or Engineering departments provided that the credit is not specifically applied toward the major. In some cases, courses may be for fewer than 3 hours; in order to determine total hours needed, simply add up the total credit hours applied to the major and add 60.

Required courses by department

**MATHEMATICS**

<table>
<thead>
<tr>
<th>Credit Hours</th>
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<td>Math 101 or 111</td>
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<tr>
<td>Math 102 or 112</td>
<td>123 or 153</td>
</tr>
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<td>Stat 280 or 305</td>
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**CHEMISTRY**

<table>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>122 or 152</td>
<td>123 or 153</td>
</tr>
<tr>
<td>124 or 154</td>
<td></td>
</tr>
</tbody>
</table>

**CORE COURSES**

- BIOL 201
- EBO 202
- Enst 100
- Escl 107 or escl 109 or 201
- Ebo 213
- Ebo 325
- Ebo 301
- ESt 4XX

**PHYSICS**

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th>101/103 (or 111 or 125 with lab)</th>
</tr>
</thead>
<tbody>
<tr>
<td>102/104 (or 112 or 126 with lab)</td>
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</tbody>
</table>

**Additional courses**

*2-3 credit hours from the following courses for Field Experience:

- Escl 103, Ebo 306, Ebo 316, Ebo 317, Ebo 319, Ebo 320,
- Ebo 324, Ebo 327, Ebo 330, Ebo 337, Escl 334, selection 1:
- Escl 380/Foto 390, Enst/ebio 379, Fwis 187 selection 2:

**Major concentration in EEB**

Two of the following: Ebo 270, Ebo/Enst 323, Ebo 372

- Selection 1: __________
- Selection 2: __________

One course (3 cr. hrs.) from the following:

- Ebo 270, Ebo 321, Ebo/Enst 323, Ebo 326,
- Ebo/bioc 331, Ebo/bioc 334, Ebo 336,
- Ebo 338, Ebo 365, Ebo 366, Ebo 372
- Escl/ebio/Enst 340

**Advanced electives**

One course from:

- **Social Sciences:** Anth/Enst 332, Anth 348, anth 381, econ/Enst 437,
  econ/Enst 480, poli 331, poli 332, poli 362, post 401, soci 304/Enst 302, soci 313, soci 423,
  soci/Enst 367
- **Humanities/Architecture:** Arch/Enst 313, Arch/Enst 322, engl 358,
  engl/swgs 367, engl/Enst 368, engl 459, hist 376, hist 425,
  huma/Enst 202, span 403
- **Natural Sciences/Engineering:** Ceve 302, Ceve/Enst/Escl 307, Ceve 308, Ceve 401, Ceve 404,
  Ceve/Enst 406, Ceve 411, Ceve 412, Ceve 420, Ceve 434, Ceve 484, chem 211 and 213,
  Enst/chbe 281, Independent Research
- Selection: __________

**Capstone requirement**

Students pursuing a BS degree must complete at least one course (at least 3 credit hours) from the following:

- Escl 390, Escl 391, Ebo 403 or 404, Escl 481
- Select: __________
The Environmental Studies minor was specifically created to provide undergraduates from a broad range of academic backgrounds with a cohesive program offering foundational literacy in the social, cultural, and scientific dimensions of environmental issues, and a cross-disciplinary holistic understanding of the challenges and solutions for creating a sustainable world. Students completing the minor will be able to synthesize frameworks, tools, and perspectives from multiple disciplines; master sustainability terminology; understand major environmental issues from multiple perspectives; develop and assess environmental solutions in an informed and logical manner; and convey knowledge and insights about environmental issues in multiple formats.

Required course:
Core course: ENST 100

Introductory courses:
One course from the following: EBIO 124, ESCI 101, ESCI 107, ESCI 109, ESCI 201 selection:

Elective courses:
Two courses from the Schools of Architecture/Humanities/Social Sciences
ANTH/ENST 332, ARCH/ENST 313, ARCH/ENST 322, ECON/ENST 437, ECON/ENST 480,
ENGL 358, ENGL 368, ENGL 459, FOTO 390/ESCI 390, HART 302, HIST 425, HUMA 202/ENST 202,
SOCI 304/ENST 302, SPAN 403
selection 1: selection 2:

Two courses from the Schools of Natural Sciences/Engineering
CEVE/ENGI 302, CEVE/ENST/ESCI 307, CEVE 310, CEVE/ENST 406, CHBE/ENST 281,
EBIO/ENST 204, EBIO 270, EBIO 319, EBIO 320, EBIO/ENST 323, EBIO 325, EBIO 327,
EBIO 372, EBIO/ENST/LPCR 379, ELEC/MSNE 365, ESCI 321, ESCI/EBIO/ENST 340,
ESCI 380/FOTO 390, ESCI 407, ESCI/CHM/ENST 425, ESCI/CEVE 450, ESCI 452
selection 1: selection 2:
# Degree Requirements for BA-MA-PhD Degree Track in Biochemistry and Cell Biology

## Admission:
Qualified Rice University undergraduates can apply to enroll in the Biochemistry and Cell Biology BA-MA-PhD program track in the spring of their sophomore year. Some course requirements for graduate studies are completed at the same time as the upper-level undergraduate degree requirements. Students who are good candidates for this program typically join a Rice Biosciences research lab to start research on a biochemistry- or cell biology-related project prior to applying. Upon acceptance, depending on course load, financial aid status, and other variables, program participants may then start taking required graduate course requirements at the same time as their upper-level undergraduate degree course requirements. Students pursuing this track should be aware that there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time (12 hours) status.

Laboratory research performed in undergraduate and graduate research courses is presented as the MA thesis in the summer following graduation and can serve as the initial phase of the PhD thesis work. As a result, the graduate careers of these students will be accelerated by an anticipated 1-2 years, and such students may be able to obtain their PhD degrees approximately 3 years after obtaining their BA-MA degree. If circumstances require, students may stop at the BA or MA level if they meet all the requirements for the respective degrees.

Criteria for selection include academic performance (GPA ≥ 3.5), motivation, previous research experience, and personal qualities. Enrollment is limited, and the Biochemistry & Cell Biology BA-MA-PhD Track Committee will select applicants for admission.

## BA in Biochemistry and Cell Biology Requirements:
All of the requirements for a BA in Biochemistry & Cell Biology are required for the BA-MA-PhD track.

## MA in Biochemistry and Cell Biology Requirements:
The BA-MA-PhD Track Committee will advise students pursuing the BA-MA completion and will approve the formal course program of students during their final two years in the BA-MA program. Students who wish to pursue the BA-MA track must select the MA thesis advisor by the end of the sophomore year when they declare their major to provide the opportunity to begin a project that will form the basis of the MA thesis.

For the MA, the following courses must be completed or evidence provided of successful completion of courses that covered the same material with a B- average (GPA ≥ 2.67):
- BIOC 581/582 Graduate Research Seminar (4 semesters attendance, 1 presentation) (4 credit hours total)
- BIOC 583 Molecular Interactions (4 credit hours)
- BIOC 587 Research Design, Proposal Writing, and Professional Development (3 credit hours)
- BIOC 588 Cellular Interactions (4 credit hours)
- UNIV 594 Training in the Responsible Conduct of Research (1 credit hour)
- BIOC 800 Graduate Research (a minimum of credit hours to reach 40 credit hours total at the graduate level)

## Elective Requirements
In addition to required courses listed above, students in the Biochemistry and Cell Biology BA-MA-PhD program must take at least six credit hours from the set of 500-level advanced BIOC electives. The full list of the 500-level Biochemistry & Cell Biology can be viewed in the Course Catalog, which can be accessed in the Course Listings online.

Students in the BA-MA track are required to register for and participate in BIOC 581/582 both semesters during their junior and senior years and present their research at least once. Students generally enroll in BIOC 800 during the summer between the sophomore and junior year, BIOC 587 and BIOC 800 during the summer between the junior and senior years, and BIOC 583 and BIOC 588 in their senior year.

Students will be responsible for the content of these courses in their MA defense (which also serves as the Admission to PhD Candidacy examination).

Progress reviews with the MA thesis committee occur at the end of the junior year and the early spring of the senior year. The MA thesis will be submitted and public oral defense will occur in the summer following graduation at the end of the senior year with completion of the BA requirements. MA candidates continuing to the PhD must maintain a GPA ≥ 3.0, complete a thesis, and make a public oral defense that includes a private examination by their MA thesis committee. Students who complete the MA requirements with a GPA ≥ 2.67 but less than 3.0 must defend their thesis to complete the MA degree, but will not be admitted to the PhD program.

Appendix - 10
PhD in Biochemistry and Cell Biology Requirements:

The following are required for admission to the PhD portion of the BA-MA-PhD track: Successful completion of the MA thesis and oral defense, which will serve as the admission to candidacy exam for all PhD candidates, a cumulative GPA $\geq 3.0$ for the BA-MA degree courses, and a GRE Quantitative test score $\geq 80$th percentile. Students who are in good standing in the BA-MA track and have passed their MA final oral exam may begin their doctoral studies the summer following graduation with the approval of their PhD mentor and the Department Chair.

Course requirements for the first year of PhD study include:

- BIOC 581/582 Graduate Research Seminar (required in all years of residency)
- BIOC 599 Graduate Teaching (two semesters)
- BIOC 800 Graduate Research

Evaluation of Progress in the PhD Phase of the BA-MA-PhD Program:
The Graduate Advisory Committee evaluates each student's record and recommends any further course work based on the requirements and on the interests of the student. Thesis advisors may require additional courses. At the end of each semester, the department chair, in consultation with the faculty, reviews student performance in the formal course work. Students must maintain at least a B average (GPA $\geq 3.0$), perform satisfactorily in their research efforts, and demonstrate outstanding motivation and potential for research. Evaluation during the PhD phase of the program includes:

- The MA thesis and its oral defense constitute the admission to candidacy examination
- Ongoing review of research progress by the thesis advisor; satisfactory research progress will be indicated by a grade of "S" in BIOC 800 each semester
- A yearly research progress assessment by the student's Research Progress Review Committee
- Presentation of research progress at least once a year in seminar format (BIOC 581/582) starting in the first year of PhD study and continuing until submission of the doctoral thesis
- Defense of the PhD thesis research and text in a final public seminar presentation and oral examination attended by the student’s Thesis Committee