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 a broad range of introductory and advanced courses that lead to undergraduate degrees in Biochemistry and Cell Biology (BA, BS), Evolutionary Biology (BA, BS), and Biological Sciences (BA). In addition, a Minor in Biochemistry and Cell Biology and a Minor in Ecology and Evolutionary Biology are offered. The BA degrees offer a rigorous biological curriculum suitable for many career paths while allowing the flexibility for extended academic exploration in other areas. The BS degrees offer greater depth in upper-level coursework. Most BioSciences students, regardless of major, participate in undergraduate research, availing themselves of the numerous research opportunities at Rice and in the Houston community.

All major degree paths will prepare students for graduate, medical, or other professional schools and a wide range of careers in the life sciences. In addition, qualified students may apply to the Biochemistry and Cell Biology BA-MS-PhD program track. Additional information on departmental programs, courses, and advising is available at the BioSciences website (https://biosciences.rice.edu/).

The BioSciences department also oversees academic programs that lead to undergraduate degrees in Environmental Science (BA, BS) and Neuroscience (BA), as well as a Minor in Neuroscience. At the graduate level, the BioSciences department administers graduate programs in Biochemistry and Cell Biology (PhD, MS) and in Ecology and Evolutionary Biology (PhD, MS). In addition, some BioSciences faculty members participate in the Systems, Synthetic, and Physical Biology (SSPB) PhD program administered by the Institute of Biosciences and Bioengineering (https://ibb.rice.edu/). Graduate studies include a combination of advanced coursework and individual research with faculty mentors.

For additional information regarding BioSciences and its associated academic programs, please see the department’s website: https://biosciences.rice.edu/.

### Bachelor’s Programs

- Bachelor of Arts (BA) Degree with a Major in Biochemistry and Cell Biology (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/biochemistry-cell-biology-ba/)

### Accelerated Program

- Bachelor of Arts (BA) Degree / Master of Science (MS) Degree / Doctor of Philosophy (PhD) Degree in the field of Biochemistry and Cell Biology (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/biochemistry-cell-biology-bs-mps-PhD/)

### Master’s Programs

- Master of Science (MS) Degree in the field of Biochemistry and Cell Biology (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/biochemistry-cell-biology-ms/)

### Doctoral Programs

- Doctor of Philosophy (PhD) Degree in the field of Biochemistry and Cell Biology (https://ga.rice.edu/programs-study/departments-programs/natural-sciences/biosciences/biochemistry-cell-biology-PhD/)

### Professors

Caroline Ajo-Franklin
Bonnie Bartel
Kathleen M. Beckingham
George M. Bennett
Daniel D. Carson
Michael C. Gustin
Oleg A. Igoshin
Caroline A. Masiello
Seiichi P.T. Matsuda
Kathleen Shive Matthews
James A. McNew
Luay K. Nakhleh
Edward P. Nikonowicz
Jose Nelson Onuchic
George Phillips
Volker H.W. Rudolf
Yousif Shamoo
Evan Siemann
Jonathan J. Silberg
Michael Stern
Charles R. Stewart
Yizhi Jane Tao
Peter C. Wolynes

Associate Professors
Matthew Bennett
Amy E. Dunham
Michael H. Kohn
Peter Y. Lwigale
Thomas E.X. Miller
Laura Segatori
Junghae Suh
Jeffrey J. Tabor
Daniel S. Wagner

Assistant Professors
Caleb Bashor
Lydia Beaudrot
James Chappell
Scott Egan
Xue Gao
Yang Gao
Isaac Hilton
Natalia Kirienko
Julia Saltz
Adrienne Simoes Correa
Rosa Uribe
Aryeh Warmflash
Han Xiao

Professors Emeriti
Frank M. Fisher, Jr.
Raymond M. Glantz
Paul A. Harcombe
Jordan Konisky
John Steven Olson
Graham A. Palmer
David Queller
Ronald L. Sass
Joan Strassman
Stephen Subtelny
Calvin H. Ward

Teaching Faculty
Beth Beason-Abmayr

Lecturers
Mary Susan Cates
Rachael Eaton
Elizabeth Eich
Cassidy Johnson
Kirstin Matthews
Caroline V. McNeil
Joseph R. Novak
Alma M. Novotny
Dereth Phillips
Collin E. Thomas

Adjunct Faculty
Richard Behringer
Sarah Bondos
Audrea Burns
Nikki Delk
J. David Dickman
Cindy Farach-Carson
Haichun Gao
Jeffrey Glassberg
Richard H. Gomer
Nancy Greig
Daniel Harrington
Maria K. Hartley
Kendal Hirschi
Kresimir Josic
Olivier Lichtarge
Jianpeng Ma
Kevin R. MacKenzie
Timothy Palzkill
Pamela Constantinou Papadopoulos
Debananda Pati
Neal R. Pellis
Susan M. Rosenberg
Clarence F. Sams
Yigong Shi
Ah-Lim Tsai
Kelly L. Weinersmith
Theodore G. Wensel
Peggy Whitson
Zheng Zhou
Huda Zoghbi

Huxley Research Instructors
David Armitage
Benedicte Bachelot

Rice Academy Fellows
Durre Muhammad
Amanda Shore

For Rice University degree-granting programs:
Biochemistry and Cell Biology (BIOC)

BIOC 110 - INTRODUCTION TO RESEARCH

Short Title: INTRODUCTION TO RESEARCH

Department: Biosciences

Grade Mode: Satisfactory/Unsatisfactory

Course Type: Research

Credit Hours: 1-5

Restrictions: Enrollment is limited to Undergraduate or Visiting undergraduate level students.

Course Level: Undergraduate Lower-Level

Description: This course is only for visiting high school juniors and seniors and undergraduates conducting research for the first time. The students will conduct scientific research in the laboratories of the Rice faculty in the areas of Biochemistry & Cell Biology and Ecology & Evolutionary Biology. During the five-week course, students will engage in full-time research and will be mentored by experienced researchers under the supervision of Rice faculty. Participating students will also receive formal instruction on the basics of scientific research and innovation. Visiting high school students and undergraduates must complete visiting student application process. Instructions to do this can be found in the Application Checklist at summer.rice.edu. Instructor Permission Required. Repeatable for Credit.

BIOC 112 - INTRODUCTORY BIOLOGICAL RESEARCH CHALLENGES

Short Title: INTRO BIOL RESEARCH CHALLENGES

Department: Biosciences

Grade Mode: Standard Letter

Course Type: Laboratory

Credit Hour: 1

Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

Course Level: Undergraduate Lower-Level

Description: 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 the Biosciences major who have very limited practical laboratory experience. Only first-year students may enroll. Mutually Exclusive: Cannot register for BIOC 112 if student has credit for BIOC 111/NSCI 120.

BIOC 118 - FRESHMAN SEMINAR IN LOCAL BIOLOGY RESEARCH (BCB)

Short Title: FRESHMAN BIOLOGY SEMINAR (BCB)

Department: Biosciences

Grade Mode: Standard Letter

Course Type: Seminar

Credit Hour: 1

Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

Course Level: Undergraduate Lower-Level

Description: A 7-week seminar course to introduce freshmen prospective biologists to the excitement of research at Rice and the Medical Center and to provide context with which to think about facts presented in biosciences textbooks. 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. In the final session, the group will tour the lab that produced the featured article. Additional tours and activities TBA. All first-year non-transfer students are eligible to enroll in BIOC 118 regardless of AP credit. This course meets in the second half of the semester and features research in the Program of Biochemistry and Cell Biology. Mutually Exclusive: Cannot register for BIOC 118 if student has credit for BIOC 115/FSEM 115.

Course URL: www.bioc.rice.edu/bioc115/ (http://www.bioc.rice.edu/bioc115/)

BIOC 122 - BIOLOGY FOR VOTERS

Short Title: BIOLOGY FOR VOTERS

Department: Biosciences

Grade Mode: Standard Letter

Course Type: Lecture

Distribution Group: Distribution Group III

Credit Hours: 3

Restrictions: Students cannot enroll who have a major in Biochemistry and Cell Biology, Biological Sciences or Ecology & Evolutionary Biology. Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

Course Level: Undergraduate Lower-Level

Description: Designer babies, climate change, the anti-vaccine movement, gender identity, evolution...exploring these and other socially relevant topics will provide a context for learning essential concepts in biology and ways to distinguish science truth from science fiction.

Course URL: www.ruf.rice.edu/~bioslabs/bioc122/ (http://www.ruf.rice.edu/~bioslabs/bioc122/)

BIOC 129 - BRAINSTEM - TEACHING STEM THROUGH NEUROSCIENCE

Short Title: BRAINSTEM

Department: Biosciences

Grade Mode: Satisfactory/Unsatisfactory

Course Type: Internship/Practicum

Credit Hour: 1

Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.

Course Level: Undergraduate Lower-Level

Description: BrainSTEM is a service organization that teaches STEM subjects through the lens of neuroscience. We perform hands-on, small-group activities with ~45 students per week. This course will prepare you to communicate science in a both effective and entertaining manner, as well as build your skills in managing small groups. More information can be found at www.brainstem.club. Repeatable for Credit.
BIOC 201 - INTRODUCTORY BIOLOGY I
Short Title: INTRODUCTORY BIOLOGY I
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Chemistry and energetics, cell physiology, cell biology, Mendelian genetics, molecular genetics, developmental biology, and plant physiology.

BIOC 205 - MICROBE HUNTERS REVISITED
Short Title: MICROBE HUNTERS REVISITED
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This seminar will review important microbiologists and their discoveries of infectious agents. From Pasteur to Prusiner, we will review the infectious agents they described, as well as the methods used for their discovery. The classic text by Paul de Kruif entitled 'Microbe Hunters' will be the basis for half of the course material.

BIOC 210 - INTRODUCTION TO RESEARCH
Short Title: INTRODUCTION TO RESEARCH
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-5
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This course is only for Rice students conducting research for the first time. The students will conduct scientific research in the laboratories of the Rice faculty in the areas of Biochemistry & Cell Biology and Ecology & Evolutionary Biology. During the five-week course, students will engage in full time research and will be mentored by experienced researchers under the supervision of Rice faculty. Participating students will also receive formal instruction on the basics of scientific research and innovation. Rice students will need a special registration from or ask the faculty member for permission to register. Instructor Permission Required. Cross-list: EBIO 210. Repeatable for Credit.

BIOC 211 - INTERMEDIATE EXPERIMENTAL BIOSCIENCES
Short Title: EXPERIMENTAL BIOSCIENCES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): BIOC 201 (may be taken concurrently) and
Description: Introduction to the scientific method, principles of experimental design, selected research strategies, record keeping, and technical communication as related to biological science. The prereq BIOC 201 may be taken concurrently with BIOC 211. Registration for Fall 2019 new matriculants requires instructor permission. Only BioSciences majors and minors (BCB, BIOS, EEB) can register for sections 001, 002, 003, 004, and 005. Non-BioSciences majors can register for sections 007, 008, 009, 010, and 011. Mutually Exclusive: Cannot register for BIOC 211 if student has credit for BIOC 212.

BIOC 212 - INTERMEDIATE EXPERIMENTAL CELLULAR AND MOLECULAR NEUROSCIENCE
Short Title: EXPERIMENTAL NEUROSCIENCE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to students with a major in Neuroscience. Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): BIOC 201 (may be taken concurrently) and
Description: Introduction to the scientific method, principles of experimental design, selected research strategies, record keeping, and technical communication as related to neuroscience. This course is restricted to Neuroscience majors. Instructor permission is required if students have not yet declared. The pre-req BIOC 201 may be taken concurrently with BIOC 212. Mutually Exclusive: Cannot register for BIOC 212 if student has credit for BIOC 211.

BIOC 215 - BIOSCIENCES LAB TEACHING
Short Title: BIOC LAB TEACHING
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 1-3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Undergraduate teaching in a biosciences laboratory. Provide group and individual instruction and feedback to undergraduates during and outside of laboratory classes. Instructor Permission Required. Repeatable for Credit.
BIOC 216 - DISCUSSION SECTION TEACHING
Short Title: DISCUSSION SECTION TEACHING
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate
Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: In this course, undergraduates who have previously excelled in a BIOC course, as approved by the Department Chair for this activity, will develop teaching skills by leading discussion sections or serving as writing mentors. These activities are designed to benefit students presently taking the relevant BIOC course and will be performed under the guidance of the professor teaching the course. Instructor Permission Required. Repeatable for Credit.

BIOC 220 - FORENSIC BIOLOGY AND CRIMINALISTICS
Short Title: FORENSIC BIOL & CRIMINALISTICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate
Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Prerequisite(s): BIOC 201
Description: This course will introduce students to certain areas of forensic science including - crime scene analysis, forensic serology, molecular genetics (DNA), forensic toxicology, drugs, and the identification of biological fluids such as blood, saliva, and semen, with case studies and a potential field trip. The course is designed for biology and chemistry students, for students interested in the application of biosciences in DNA and crime scene analysis.

BIOC 238 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Lecture, Seminar, Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate
Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Topics and credit hours vary each semester. Contact department for current semester’s topic(s). Repeatable for Credit.

BIOC 299 - EXPERIENTIAL EDUCATION IN BIOSCIENCES
Short Title: EXPERIENTIAL EDUC IN BIOS
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Internship/Practicum
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate
Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This experiential education course credits a student’s experience in an approved internship/practicum with the goal of further developing their professional skills. Hour and activity requirements are flexible to accommodate a variety of experiential activities in biology-related professional contexts. There are no prerequisites. To receive approval to enroll, students must arrange their own internship, apply to the course instructor (https://forms.gle/NGruMJZyiYRRNN5CL8), and produce an offer letter from their internship provider containing, start and end dates, a description of their intended internship activities and expectations. Additional requirements are available on the course syllabus. Repeatable for credit. Instructor Permission Required. Repeatable for Credit.

BIOC 300 - PARADIGMS IN BIOCHEMISTRY AND CELL BIOLOGY
Short Title: PARADIGMS IN BIOCHM & CELL BIO
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate
Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Examination of paradigms in Biochemistry and Cell Biology with a focus on the ‘central dogma’ of molecular biology. Recommended strongly for students with Advanced Placement in Biology and designed for prospective BIOC majors. This course is strongly recommended as preparation for BIOC 341 (Cell Biology). Enrollment is restricted to students who have not yet taken BIOC 301 or BIOC 341. Recommended Prerequisite(s): Recommended strongly for students with Advanced Placement in Biology and designed for prospective BIOC majors. For students with AP credit for BIOS/BIOC 201, this course is strongly recommended as preparation for BIOC 341 (Cell Biology).

BIOC 301 - BIOCHEMISTRY I
Short Title: BIOCHEMISTRY I
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate
Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): CHEM 211 and BIOC 201
Description: The second in an integrated sequence of three courses (BIOC 201, 301, 302). Structure and function of proteins, enzymes, and nucleic acids; enzyme kinetics; glycolysis, aerobic metabolism, and energy coupling. Recommended Prerequisite(s): CHEM 212.
BIOSC 302 - BIOCHEMISTRY II
Short Title: BIOCHEMISTRY II
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 301
Description: The final in an integrated sequence of three courses (BIOC 201, 301, 302). In depth study of carbohydrate, amino acid, and lipid metabolic pathways, hormone regulation of metabolic path ways, key cell signaling mechanisms, and the structural biology of DNA replication, transcription, and translation into proteins. Course also involves analysis of primary scientific literature. Recommended Prerequisite(s): CHEM 212 or CHEM 320.

BIOSC 310 - INDEPENDENT RESEARCH FOR BIOCHEMISTRY AND CELL BIOLOGY UNDERGRADUATES
Short Title: IND RES FOR BIOC UNDERGRADS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 111 or BIOC 211 or BIOC 212 or BIOC 112 or NSCI 120
Description: Independent research in Rice BCB faculty laboratories (sections 2 and above) or other Texas Medical Center laboratories (sections 1). Students spend at least 3 hours per week in the laboratory for each semester hour of credit. If taken for 3 or more hours, counts as one required 300+ level lab course (not BIOC 311). Requires a proposal abstract, weekly reports, and a research paper (fall semester) or a proposal abstract, weekly reports, and a poster presentation (spring semester). Students wishing to perform their research in an off-campus lab must apply online (www.bioc.rice.edu/bioc310/) at least 3 weeks prior to the start of classes and may not register for fewer than 3 credit hours. Students taking BIOC 310 in the full summer semester must be available to do full-time research for a minimum of 6 weeks or part-time equivalent which should equal to a total of 126 hours working in the lab. Instructor Permission Required. Recommended Prerequisite(s): Students are strongly advised to secure research advisors and register for the course well in advance of the start of classes. Repeatable for Credit.
Course URL: www.bioc.rice.edu/bioc310/(http://www.bioc.rice.edu/bioc310/)

BIOSC 311 - ADVANCED EXPERIMENTAL BIOSCIENCES
Short Title: ADV EXPERIMENTAL BIOSCIENCES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Students with a class of Freshman may not enroll. Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (BIOC 211 or BIOC 212) and BIOC 301 (may be taken concurrently)
Description: Advancement of biochemical laboratory methods, record keeping, technical communication skills, and research strategies. Students will maintain a research quality laboratory notebook and will submit a paper in the style of a journal article. Pre-req BIOC 301 may be taken concurrently with BIOC 311.

BIOSC 313 - EXPERIMENTAL SYNTHETIC BIOLOGY
Short Title: EXPERIMENTAL SYNTHETIC BIOL
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 211 or BIOC 212
Description: Students learn molecular biological procedures commonly used to build and characterize synthetic genetic circuits. Teams of students work on a research project in the interdisciplinary field of synthetic biology. Students continue to develop technical communication skills.

BIOSC 318 - MICROBIOLOGY LABORATORY
Short Title: MICROBIOLOGY LABORATORY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 211 or BIOC 212
Description: In teams, students will participate in ongoing faculty research by isolating and characterizing bacterial species from environmental samples. Offered in the second half of each semester.
Course URL: www.ruf.rice.edu/~bioslabs/bios318/(http://www.ruf.rice.edu/~bioslabs/bios318/)
BIOC 320 - LABORATORY IN TISSUE CULTURE
Short Title: LABORATORY IN TISSUE CULTURE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOE 440 or STAT 440 or BIOC 311
Description: Introduction to tissue culture techniques, including cell passage, cell viability, and cell attachment and proliferation assays. Students complete quantitative analysis of their data. Engineering design and applications are featured in graded work. Sections 1 and 2 are taught during the first half of the semester. Sections 3 and 4 are taught during the second half of the semester. Students may be required to attend lab on a university holiday. Instructor Permission Required. Cross-list: BIOC 342.

BIOC 329 - ANIMAL BIOLOGY AND PHYSIOLOGY
Short Title: ANIMAL BIOLOGY AND PHYSIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 or EBI 202
Description: The evolution and systematics of the animal kingdom with consideration of functional anatomy, comparative physiology, behavior, medical implications and resource management. Cross-list: EBI 329. Mutually Exclusive: Cannot register for BIOC 329 if student has credit for EBI 529.

BIOC 330 - BIOLOGY OF INFECTIOUS DISEASES
Short Title: BIOLOGY OF INFECTIOUS DISEASES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 211 or BIOC 212
Description: This course gives a broad overview of the biology of infectious diseases using examples from humans, plants, and animals. Topics include diversity of diseases, mechanisms of disease transmission, epidemiology, population regulation, evolution of virulence, disease dynamics in natural communities and disease invasion and conservation biology. Cross-list: EBI 331.

BIOC 331 - EVOLUTION
Short Title: EVOLUTION
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBI 202
Description: This course gives a broad overview of the biology of infectious diseases using examples from humans, plants, and animals. Topics include diversity of diseases, mechanisms of disease transmission, epidemiology, population regulation, evolution of virulence, disease dynamics in natural communities and disease invasion and conservation biology. Cross-list: EBI 331.

IDEATION TO TECHNOLOGY DEVELOPMENT
Short Title: IDEATION TO TECHNOLOGY DEVELOPMENT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and PHYS 101 and PHYS 102 or PHYS 125 and PHYS 126
Description: This course will teach the fundamentals of human physiology with a specific focus on the nervous, cardiovascular, respiratory, and urinary systems. Basic introductory engineering principles will be applied to the study of physiological systems. The course is aimed to be accessible to students with non-engineering backgrounds. Students may receive credit for only one of BIOC 302, BIOC 322, and BIOC 332. Cross-list: BIOC 302. Mutually Exclusive: Cannot register for BIOC 332 if student has credit for BIOC 332.

STUDENT INNOVATION STUDIO: FROM BASIC RESEARCH AND IDEATION TO TECHNOLOGY DEVELOPMENT
Short Title: STUDENT INNOVATION STUDIO
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 or BIOE 302
Description: In this lab, students will explore the relationship between curiosity-driven science and the steps of biological ideation that lead to technology creation. While the course focuses centrally on a semester long lab project, there will be informal discussions of articles and books with technology translation experts, visiting biology entrepreneurs, and commercialization experts.
BIOC 335 - CELLULAR AND MOLECULAR ANIMAL PHYSIOLOGY  
Short Title: CELL & MOL ANIMAL PHYSIOLOGY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 201  
Description: 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. Graduate/Undergraduate Equivalency: BIOC 536. Mutually Exclusive: Cannot register for BIOC 335 if student has credit for BIOC 536.

BIOC 341 - CELL BIOLOGY  
Short Title: CELL BIOLOGY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 201  
Description: Molecular mechanisms of eukaryotic cell function. Structure, function, and biogenesis of all subcellular organelles. Cell-cell communication, cytoskeleton assembly and function, cell cycle control, and cell-cell adhesions. Emphasis will be on cytoplasmic events; molecular studies of transcription are taught in BIOC 302 and BIOC 344. RECOMMENDATION: BIOC 300 is recommended for students using advanced placement credit for BIOC 201 and students preferring additional foundational background prior to enrollment in BIOC 341.

BIOC 344 - MOLECULAR BIOLOGY AND GENETICS  
Short Title: MOLECULAR BIOLOGY & GENETICS  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Description: Mendelian genetics, population genetics, mapping, gene expression and regulation, genetic engineering, DNA replication and recombination, human genetics, genetic disease and gene therapy. Recommended Prerequisite(s): BIOC 201.

BIOC 350 - INTRODUCTION TO MATHEMATICAL BIOLOGY  
Short Title: INTRODUCTION TO MATH BIOLOGY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): (PHYS 126 or PHYS 102 or PHYS 112) and MATH 211 and (BIOC 201 or EBIO 202)  
Description: This class provides an introduction to mathematical concepts in biology and medicine. Students will learn to derive and manipulate mathematical equations describing concepts at all levels of biological organization, from biochemical reactions to population dynamics and epidemiology.

BIOC 352 - PHYSICAL CHEMISTRY FOR THE BIOSCIENCES  
Short Title: PHYS CHEM FOR BIOSCIENCES  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): (PHYS 126 or PHYS 102 or PHYS 112 or PHYS 142) and BIOC 301  
Description: Study of selected aspects of physical chemistry as it relates to the biosciences. Includes thermodynamics, reaction rate theory, quantum mechanics, and atomic and molecular structure.

BIOC 361 - METABOLIC ENGINEERING FOR GLOBAL HEALTH ENVIRONMENTS  
Short Title: METAB ENG GLOBAL HEALTH ENVMT  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): (BIOC 362 or GLHT 362) and (PHYS 126 or PHYS 102 or PHYS 112 or PHYS 142) and (MATH 102 or MATH 106)  
Description: Importance of nutritional and pharmaceutical compounds, impact of cost of compounds on global health; Overview of biochemical pathways; metabolite analysis; Genetic engineering and molecular biology tools for ME; Pharmaceuticals and drug discovery approaches (antibiotics, antivirals; anti-parasite compounds); anti-diarrhea treatments; vaccines. Cross-list: BIOC 361, GLHT 361.  
Course URL: www.btb.rice.edu (http://www.btb.rice.edu)
BIOC 368 - CONCEIVING AND MISCONCEIVING THE MONSTROUS IN FICTION AND IN ART, IN MEDICINE AND IN BIOSCIENCE
Short Title: MONSTER
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: This course will offer students a close-up look at an area of contemporary biological and biomedical research in a small-group seminar setting. Each seminar will focus on a different area of research through reading and discussion of recent research articles in that focus area. The faculty discussion leader for each seminar will be drawn from Baylor College of Medicine, UT Health Science Center, MD Anderson Cancer Center, Rice and others. Prereqs may be taken concurrently. Please consult the course website for additional prerequisites, notes from the instructor, and other information specific to each section. Repeatable for Credit.

BIOC 371 - SEMINAR IN CONTEMPORARY BIOLOGICAL AND BIOMEDICAL RESEARCH
Short Title: BIOMEDICAL RESEARCH SEMINAR
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 341 (may be taken concurrently) or BIOC 301 (may be taken concurrently)
Description: This course will offer students a close-up look at an area of contemporary biological and biomedical research in a small-group seminar setting. Each seminar will focus on a different area of research through reading and discussion of recent research articles in that focus area. The faculty discussion leader for each seminar will be drawn from Baylor College of Medicine, UT Health Science Center, MD Anderson Cancer Center, Rice and others. Prereqs may be taken concurrently. Please consult the course website for a complete listing of seminars offered each semester. Please refer to the following link for additional information: http://www.bioc.rice.edu/bioc371. Instructor Permission Required. Recommended Prerequisite(s): Students should check the courses website for additional prerequisites, notes from the instructor, and other information specific to each section. Repeatable for Credit.

BIOC 372 - IMMUNOLOGY
Short Title: IMMUNOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201
Description: Cellular and molecular basis of innate and adaptive immune function in mammals. Graduate/Undergraduate Equivalency: BIOC 573. Recommended Prerequisite(s): BIOC 301 and BIOC 341. Mutually Exclusive: Cannot register for BIOC 372 if student has credit for BIOC 573/BIOS 372.

BIOC 385 - FUNDAMENTALS OF CELLULAR AND MOLECULAR NEUROSCIENCE
Short Title: NEUROSYSTEMS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201
Description: Cellular, molecular, and integrative mechanisms of neural function, including membrane and axon physiology, synaptic transmission and plasticity, sensory transduction and processing. Cross-list: NEUR 380, PSYC 380. Recommended Prerequisite(s): PSYC 101.

BIOC 385 - FUNDAMENTALS OF CELLULAR AND MOLECULAR NEUROSCIENCE
Short Title: FUNDAMENTALS OF NEUROSCIENCE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201
Description: Cellular, molecular, and integrative mechanisms of neural function, including membrane and axon physiology, synaptic transmission and plasticity, sensory transduction and processing. Cross-list: NEUR 385. Graduate/Undergraduate Equivalency: BIOC 585. Mutually Exclusive: Cannot register for BIOC 385 if student has credit for BIOC 585.

BIOC 390 - FUNDAMENTAL NEUROSCIENCE SYSTEMS
Short Title: NEUROSYSTEMS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 1
Course Level: Undergraduate Upper-Level
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Description: For transfer of courses which have no current equivalent in the Rice curriculum, but which can be counted as 300 level BIOC lecture courses, in satisfying requirements for majors in Biosciences. Repeatable for Credit.

BIOC 393 - LABORATORY TRANSFER CREDIT IN BIOCHEMISTRY AND CELL BIOLOGY
Short Title: LAB TRANSFER CREDIT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Transfer
Credit Hours: 3
Course Level: Undergraduate Upper-Level
Description: For transfer of an advanced laboratory course in the Biochemistry and Cell Biology that has no current equivalent in the Rice curriculum. Any student may receive a maximum of one credit of BIOC 393.
BIOC 401 - UNDERGRADUATE HONORS RESEARCH
Short Title: UNDERGRADUATE HONORS RESEARCH
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 5
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: The Biochemistry and 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. Students having performed BIOS/BIOC 310 research in an off-campus laboratory in the Texas Medical Center will also be eligible to apply to perform honors research in that laboratory. The Honors Research Program courses function as a set and must all be taken in the same academic year. Registration for any of the courses requires a commitment to register for all three. Requires at least 15 hours of laboratory research per week, a proposal (revised from application), monthly reports, and a formal progress report (abstract, aims, progress toward aims, discussion of results, plans for the spring semester). Prerequisites: strong performance in (BIOC 310, or HONS 470/471) and BIOC 211 and either BIOC 301 or BIOC 341. Research professor recommendation required. Application for admission required (BCB Honors Program OwlSpace Resources). Department Permission Required. Repeatable for Credit.

BIOC 402 - UNDERGRADUATE HONORS RESEARCH
Short Title: UNDERGRADUATE HONORS RESEARCH
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 5
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 401
Corequisite: BIOC 412
Description: This companion seminar requires attendance at course meetings and a formal scientific presentation of research performed while enrolled in the Honors Research Program. Repeatable for Credit.

BIOC 403 - PHYSICAL BIOLOGY
Short Title: PHYSICAL BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 352 and MATH 211
Description: This course provides a biophysical view of living systems, from the subcellular to the multicellular scales. Topics include: biomolecular dynamics, cellular biomechanics, cell motility and cell division, calcium signaling, action potential propagation, and tissue organization. Graduate/Undergraduate Equivalency: BIOC 501.

BIOC 404 - UNDERGRADUATE RESEARCH SEMINAR
Short Title: UNDERGRADUATE RESEARCH SEMINAR
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 401
Corequisite: BIOC 402
Description: This companion seminar requires attendance at course meetings and a formal scientific presentation of research performed while enrolled in the Honors Research Program. Repeatable for Credit.

BIOC 412 - EXPERIMENTAL PHYSIOLOGY
Short Title: EXPERIMENTAL PHYSIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (BIOC 311 or BIOC 385 (may be taken concurrently) or NEUR 385 (may be taken concurrently)) and (BIOC 211 or BIOC 212)
Description: Laboratory studies in membrane, nerve, and muscle physiology, with emphasis on experimental design, data analysis, and data interpretation. BIOC/NEUR 385 may be taken concurrently with BIOC 415.
Course URL: www.ruf.rice.edu/~bioslabs/bios415 (http://www.ruf.rice.edu/~bioslabs/bios415/)
BIOC 417 - EXPERIMENTAL CELL AND MOLECULAR NEUROSCIENCE  
Short Title: ADV EXPERIMENTAL NEUROSCIENCE  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Laboratory  
Credit Hour: 1  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 212 and CAAM 210 and (STAT 305 or STAT 310 or ECON 307 or STAT 312) and (BIOC 385 or NEUR 385)  
Description: Students will explore the molecular properties of neurons and related cells using standard techniques in the field. Experiments will include manipulating exocytosis, examining protein expression levels in different brain regions of mice, and culturing primary neurons. Lessons will also include a brief lecture/discussion on fundamental principles within cellular and molecular neuroscience.

BIOC 424 - MICROBIOLOGY AND BIOTECHNOLOGY  
Short Title: MICROBIOLOGY & BIOTECHNOLOGY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 201  
Description: Structure and functions of microorganisms with emphasis on their environmental, industrial and medical importance. Graduate/Undergraduate Equivalency: BIOC 524. Recommended Prerequisite(s): BIOC 301 or Instructor Permission. Mutually Exclusive: Cannot register for BIOC 424 if student has credit for BIOC 524.

BIOC 425 - PLANT MOLECULAR GENETICS AND DEVELOPMENT  
Short Title: PLANT MOLECULAR GENETICS  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 301 or BIOC 341  
Description: Novel aspects of plant biology and development with emphasis on molecular and genetic mechanisms. Plant responses to the environment and the use of bioengineering and other means to develop new plant products will also be covered. Graduate/Undergraduate Equivalency: BIOC 525. Mutually Exclusive: Cannot register for BIOC 425 if student has credit for BIOC 525.

BIOC 442 - MOLECULES, MEMORY AND MODEL ANIMALS: METHODS IN BEHAVIORAL NEUROSCIENCE  
Short Title: BEHAVIORAL NEUROSCIENCE  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 380 or NEUR 380 or PSYC 380 or BIOC 385 or NEUR 385 and (PSYC 203 or EBIO 321) and (STAT 305 or STAT 310 or ECON 307 or STAT 312)  
Description: This will be a combined lecture/discussion course on historical and current methods in behavioral neuroscience using primary literature. Topics will include the molecular basis of memory, genetic impacts on cognition, and possible epigenetic influences on behavior. Special emphasis will be placed on discussing different model organism and their benefits/drawbacks in neuroscience research.

BIOC 444 - DEVELOPMENTAL NEUROBIOLOGY  
Short Title: NEURODEVELOPMENT  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 341 or BIOC 301 or BIOC 344  
Description: An advanced undergraduate and graduate level course, dedicated to analysis and evaluation of scientific inquiry into animal development and neurodevelopment. Textbook based lectures and discussions based on primary scientific literature are used to exemplify and evaluate concepts and methodology. Writing assignments, quizzes, midterm and final exam will be used to evaluate performance. Graduate/Undergraduate Equivalency: BIOC 544. Mutually Exclusive: Cannot register for BIOC 443 if student has credit for BIOC 544.

BIOC 445 - ADVANCED MOLECULAR BIOLOGY AND GENETICS  
Short Title: ADV MOLECULAR BIOL & GENETICS  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.  
Course Level: Undergraduate Upper-Level  
Prerequisite(s): BIOC 301 or BIOC 344  
Description: Molecular and genetic aspects of the regulation of gene expression as seen in simple prokaryotic systems and the model eukaryotic systems used for studies of development. Graduate/Undergraduate Equivalency: BIOC 545. Mutually Exclusive: Cannot register for BIOC 445 if student has credit for BIOC 545.
BIOC 447 - EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE
Short Title: BIOLOGY AND MEDICINE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 301 or BIOC 341 or BIOC 344
Description: Current biological methods offer the potential to transform health care. We will examine the biology and methodology of emergent health care technologies such as stem cell therapy and personal genome sequencing to understand their potential to impact human health. Graduate/Undergraduate Equivalency: BIOC 547.

BIOC 449 - ADVANCED CELL AND MOLECULAR NEUROSCIENCE
Short Title: ADV CELL AND MOLECULAR NEURO
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 385 or NEUR 385 and BIOC 201 and BIOC 212 and (MATH 102 or MATH 106) and (STAT 305 or STAT 310 or ECON 307 or STAT 312)
Description: This course will be an overview of advanced principles and techniques in cell and molecular neuroscience; subjects will include bioelectricity, cellular signaling, and the molecular mechanics of neuronal plasticity. The class will primarily be lecture driven. However, there will be seminar component – students will review primary scientific literature, discuss it in small groups, and present their findings. Graduate/Undergraduate Equivalency: BIOC 549. Recommended Prerequisite(s): NEUR 380 or BIOC 380 or PSYC 380. Mutually Exclusive: Cannot register for BIOC 449 if student has credit for BIOC 549.

BIOC 450 - VIRUSES AND INFECTIOUS DISEASES
Short Title: VIRUSES & INFECTIOUS DISEASES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 301 or BIOC 341
Description: Animal viruses, especially those relevant to human health, will be discussed. Topics primarily focus on virus structure and the molecular biology of the virus life cycle. Practical issues such as the history of viral diseases, clinical manifestations, laboratory diagnosis, management and prevention will also be discussed. Graduate/Undergraduate Equivalency: BIOC 550. Mutually Exclusive: Cannot register for BIOC 450 if student has credit for BIOC 550.

BIOC 455 - COMPUTATIONAL SYNTHETIC BIOLOGY
Short Title: COMP SYNTHETIC BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): MATH 211
Description: Mathematical and computational techniques of cell biology and synthetic biology. Topics include deriving and implementing mathematical and computational models of cellular growth and division, evolution, gene regulation, synthetic gene circuits, enzymatic processing, and stochastic processes in biology. Graduate/Undergraduate Equivalency: BIOC 555. Recommended Prerequisite(s): CAAM 210

BIOC 460 - CANCER BIOLOGY
Short Title: CANCER BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 301 and BIOC 341
Description: Provides an integrated lecture series summarizing current knowledge in cancer biology and integrating current literature with basic concepts. Topics include: statistics of incidence/survival, types of cancer, pathology, the process of carcinogenesis and sources of carcinogens, genetic and epigenetic mechanisms and consequences, cancer progression, metastasis and current treatment options. Students will learn to use online databases to develop independent strategies for analyzing datasets. There will be several writing assignments and in class oral presentations of research articles. Graduate/Undergraduate Equivalency: BIOC 560. Mutually Exclusive: Cannot register for BIOC 460 if student has credit for BIOC 560.

BIOC 464 - EXTRACELLULAR MATRIX
Short Title: EXTRACELLULAR MATRIX
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOS 341 or BIOC 341
Description: This course will address the biology, organization, mechanics, and turnover of extracellular matrix. There will be an emphasis on cells and cell-matrix interactions, matrix distribution within and design of connective tissues and organs techniques for quantitative analysis of matrix, techniques for measurement and modeling of connective tissue biomechanics, changes with growth and aging and tissue/matrix degradation. Cross-list: BIOE 464. Graduate/Undergraduate Equivalency: BIOC 523. Recommended Prerequisite(s): BIOE 372, BIOC 341. Mutually Exclusive: Cannot register for BIOC 464 if student has credit for BIOC 523.
BIOC 470 - COMPUTATION WITH BIOLOGICAL DATA
Short Title: COMPUTATION WITH BIOL DATA
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): (BIOC 301 or BIOC 341 or BIOC 344) and (MATH 102 or MATH 106)
Description: This course will teach programming and analysis techniques essential for modern research in the biological sciences. Students will learn the basics of programming in the MATLAB or Python scripting languages and applications to analyzing biological data. There will be a particular focus on quantitative image and sequence analysis. Graduate/Undergraduate Equivalency: BIOC 570. Mutually Exclusive: Cannot register for BIOC 470 if student has credit for BIOC 570.

BIOC 477 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Laboratory, Lecture, Seminar, Independent Study, Lecture/Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Topics and credit hours may vary each semester. Contact department for current semester’s topic(s). Repeatable for Credit.

BIOC 481 - MOLECULAR BIOPHYSICS I
Short Title: MOLECULAR BIOPHYSICS I
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 301 or BIOC 352
Description: Focus on principles of common biophysical methods used for study of conformations and dynamics of biological macromolecules and assemblies. Topics cover spectroscopic methods (absorption, fluorescence, circular dichroism, epr, NMR), transport processes, sedimentation, calorimetry, mass spectrometry, crystallography, cryo-electron microscopy, atomic force microscopy, ligand-protein interactions, protein folding, single molecule detection, computer simulations, functional genomics and laboratory evolution. Biological examples will be used to demonstrate merits and complementarity in each of the biophysical methods. Graduate/Undergraduate Equivalency: BIOC 551.

BIOC 482 - STRUCTURAL BIOLOGY
Short Title: STRUCTURAL BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 301 and (PHYS 101 or PHYS 125) and (PHYS 102 or PHYS 126)
Description: Structural biology plays an important role in defining atomic structures of biomolecules and understanding relationships between structure, dynamics and function in living systems. This course will give an introduction to techniques of determining biomolecular structures, X-ray crystallography, NMR, and cryoelectron microscopy and discuss striking examples of the power of structural biology. Graduate/Undergraduate Equivalency: BIOC 552. Mutually Exclusive: Cannot register for BIOC 482 if student has credit for BIOC 552.

BIOC 501 - PHYSICAL BIOLOGY
Short Title: PHYSICAL BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Basic introduction to a biophysical view of living systems, from the subcellular to the multicellular scales. Topics include: biomolecular dynamics, cellular biomechanics, cell motility and cell division, calcium signaling, action potential propagation, and tissue organization. Cross-list: BIOE 502, SSPB 501. Graduate/Undergraduate Equivalency: BIOC 403.

BIOC 505 - EXTRACELLULAR MATRIX
Short Title: EXTRACELLULAR MATRIC
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course will address the biology, organization, mechanics, and turnover of extracellular matrix. There will be an emphasis on cells and cell-matrix interactions, matrix distribution within and design of connective tissues and organs techniques for quantitative analysis of matrix, techniques for measurement and modeling of connective tissue biomechanics, changes with growth and aging and tissue/matrix degradation. Additional projects will be required of graduate level students. Cross-list: BIOE 524, Graduate/Undergraduate Equivalency: BIOC 464. Recommended Prerequisite(s): BIOE 372, BIOC/ BIOC 341. Mutually Exclusive: Cannot register for BIOC 523 if student has credit for BIOC 464.
BIOC 524 - MICROBIOLOGY & BIOTECHNOLOGY  
Short Title: MICROBIOLOGY & BIOTECHNOLOGY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: Structure and functions of microorganisms with emphasis on their environmental, industrial and medical importance. Graduate/Undergraduate Equivalency: BIOC 424. Mutually Exclusive: Cannot register for BIOC 524 if student has credit for BIOC 424.

BIOC 525 - PLANT MOLECULAR GENETICS AND DEVELOPMENT  
Short Title: PLANT MOLECULAR GENETICS  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: Novel aspects of plant biology and development with emphasis on molecular and genetic mechanisms. Plant responses to the environment and the use of bioengineering and other means to develop new plant products will also be covered Graduate/Undergraduate Equivalency: BIOC 425. Mutually Exclusive: Cannot register for BIOC 525 if student has credit for BIOC 425.

BIOC 530 - LAB MODULE IN NMR SPECTROSCOPY AND MOLECULAR MODELING  
Short Title: LAB MOD NMR SPECTROSCOPY&MOLEC  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture/Laboratory  
Credit Hour: 1  
Restrictions: Enrollment is limited to Graduate level students.  
Prerequisite(s): BIOC 481 or BIOC 482 (may be taken concurrently) or BIOC 552 (may be taken concurrently) or BIOC 551  
Course Level: Graduate  
Description: The students will learn to set up, acquire, and process one-dimensional and basic two-dimensional NMR experiments. Spectral interpretation (3D molecular modeling of proteins and nucleic acids) for nucleic acids and proteins using homonuclear and heteronuclear data. Enrollment limited to 12, with priority to graduate students. Offered first half of the semester. BIOC 482/552 may be taken concurrently with BIOC 530.

BIOC 532 - LABORATORY MODULE IN OPTICAL SPECTROSCOPY AND KINETICS  
Short Title: LAB MOD OPTICAL SPECTROSCOPY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Laboratory  
Credit Hours: 2  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: Students learn the principles behind fluorescence, circular dichroism, analytical ultracentrifugation, spectroscopy and rapid kinetics by carrying out experiments with genetically engineered proteins and state-of-the-art equipment. Data will be interpreted and manipulated using curve-fitting and graphics software. Offered second half of the semester. Recommended Prerequisite(s): BIOC 352 or equivalent. Concurrent or previous enrollment in BIOC 481 or BIOC 551.

BIOC 533 - BIOINFORMATICS & COMPUTATIONAL BIOLOGY  
Short Title: BIOINFORMATICS  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 2  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: An introduction to the emerging field of bioinformatics. A series of lectures, combined with hands-on exercises. The topics to be discussed include sequence comparison, structure analysis, phylogenetics, database searching, microarrays and proteomics. Recommended prerequisite(s): BIOC 301 or permission of instructor.

BIOC 534 - EVOLUTION  
Short Title: EVOLUTION  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: Principles of biological evolution. Topics include natural selection, adaptation, molecular evolution, formation of new species, the fossil record, biogeography, and principles of classification. Instructor Permission Required. Cross-list: EBIO 534. Graduate/Undergraduate Equivalency: BIOC 334. Mutually Exclusive: Cannot register for BIOC 534 if student has credit for BIOC 334.

BIOC 535 - PRACTICAL X-RAY CRYSTALLOGRAPHY  
Short Title: PRACT X-RAY CRYSTALLOGRAPHY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Laboratory  
Credit Hours: 2  
Restrictions: Enrollment is limited to Graduate level students.  
Prerequisite(s): BIOC 552 (may be taken concurrently) or BIOC 482 (may be taken concurrently)  
Course Level: Graduate  
Description: This is an introduction to macromolecular crystallography with emphasis on crystallization methods, data acquisition, processing and molecular model-building. Approaches to solving structures will be discussed, as well as refinement of molecular models. Offered second half of the semester. Prerequisites are concurrent and may be taken the same semester.

BIOC 536 - CELLULAR AND MOLECULAR ANIMAL PHYSIOLOGY  
Short Title: CELL & MOL ANIMAL PHYSIOLOGY  
Department: Biosciences  
Grade Mode: Standard Letter  
Course Type: Lecture  
Credit Hours: 3  
Restrictions: Enrollment is limited to Graduate level students.  
Course Level: Graduate  
Description: This course investigates animal physiology from a cellular and molecular perspective. Using an integrated and comparative approach, students learn how animals maintain homeostasis. Students will read primary literature to explore physiological adaptations for survival in extreme conditions. Graduate/Undergraduate Equivalency: BIOC 335. Mutually Exclusive: Cannot register for BIOC 536 if student has credit for BIOC 335.
BIOC 537 - ADVANCED STRUCTURAL BIOLOGY SEMINAR
Short Title: ADV STRUCTURAL BIOLOGY SEMINAR
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: One hour seminar course in theoretical and practical aspects of crystallography, primarily as it applies to macromolecular crystallography. Presentations will be given by instructors and students on advanced topics based on published works or original research. Repeatable for Credit.

BIOC 540 - METABOLIC ENGINEERING
Short Title: METABOLIC ENGINEERING
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate

BIOC 544 - DEVELOPMENTAL NEUROBIOLOGY
Short Title: NEURODEVELOPMENT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): BIOC 341 or BIOC 301 or BIOC 344
Description: An advanced undergraduate and graduate level course, dedicated to analysis and evaluation of scientific inquiry into animal development. Textbook based lectures and discussions based on primary scientific literature are used to exemplify and evaluate concepts and methodology. Writing assignments, quizzes, midterm and final exam will be used to evaluate performance. Graduate/Undergraduate Equivalency: BIOC 444. Mutually Exclusive: Cannot register for BIOC 544 if student has credit for BIOC 443.

BIOC 547 - EXPERIMENTAL BIOLOGY AND THE FUTURE OF MEDICINE
Short Title: BIOLOGY AND THE FUTURE OF MEDICINE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Current biological methods offer the potential to transform health care. We will examine the biology and methodology of emergent health care technologies such as stem cell therapy and personal genome sequencing to understand their potential to impact human health. Graduate/Undergraduate Equivalency: BIOC 447. Recommended Prerequisite(s): BIOC 301 or BIOC 341 or BIOC 344.

BIOC 549 - ADVANCED CELL AND MOLECULAR NEUROSCIENCE
Short Title: ADV CELL AND MOLECULAR NEURO
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): (BIOC 385 or NEUR 385) and BIOC 201 and BIOC 212 and (MATH 102 or MATH 106) and (STAT 305 or STAT 310 or ECON 307 or STAT 312)
Description: This course will be an overview of advanced principles and techniques in cell and molecular neuroscience; subjects will include bioelectricity, cellular signaling, and the molecular mechanics of neuronal plasticity. The class will primarily be lecture driven. However, there will be seminar component — students will review primary scientific literature, discuss it in small groups, and present their findings. Graduate/Undergraduate Equivalency: BIOC 449. Recommended Prerequisite(s): NEUR 380 or BIOC 380 or PSYC 380 Mutually Exclusive: Cannot register for BIOC 549 if student has credit for BIOC 449.

BIOC 550 - VIRUSES AND INFECTIOUS DISEASES
Short Title: VIRUSES & INFECTIOUS DISEASES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): BIOC 301 or BIOC 341
Description: Animal viruses, especially those relevant to human health, will be discussed. Topics primarily focus on virus structure and the molecular biology of the virus life cycle. Practical issues such as the history of viral diseases, clinical manifestations, laboratory diagnosis, management and prevention will also be discussed. Graduate/Undergraduate Equivalency: BIOC 450. Mutually Exclusive: Cannot register for BIOC 550 if student has credit for BIOC 450.

BIOC 545 - ADVANCED MOLECULAR BIOLOGY AND GENETICS
Short Title: ADV MOLECULAR BIOL & GENETICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Molecular and genetic aspects of the regulation of gene expression as seen in simple prokaryotic systems and the model eukaryotic systems used for studies of development. Graduate/Undergraduate Equivalency: BIOC 445. Mutually Exclusive: Cannot register for BIOC 545 if student has credit for BIOC 445.
**BIOC 551 - MOLECULAR BIOPHYSICS**

**Short Title:** MOLECULAR BIOPHYSICS I  
**Department:** Biosciences  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Graduate level students.  
**Course Level:** Graduate  
**Prerequisite(s):** BIOC 301 or BIOC 352  
**Description:** Focus on principles of common biophysical methods used for study of conformations and dynamics of biological macromolecules and assemblies. Topics cover spectroscopic methods (absorption, fluorescence, circular dichroism, epr, NMR), transport processes, sedimentation, calorimetry, mass spectrometry, crystallography, cryo-electron microscopy, atomic force microscopy, ligand-protein interactions, protein folding, single molecule detection, computer simulations, functional genomics and laboratory evolution. Biological examples will be used to demonstrate merits and complementarity in each of the biophysical methods. Graduate/Undergraduate Equivalency: BIOC 481.

**BIOC 552 - STRUCTURAL BIOLOGY**

**Short Title:** STRUCTURAL BIOLOGY  
**Department:** Biosciences  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Graduate level students.  
**Course Level:** Graduate  
**Description:** Structural biology plays an important role in defining atomic structures of biomolecules and understanding relationships between structure, dynamics and function in living systems. This course will give an introduction to techniques of determining biomolecular structures, X-ray crystallography, NMR, and cryoelectron microscopy and discuss striking examples of the power of structural biology. Graduate/Undergraduate Equivalency: BIOC 482. Recommended prerequisite(s): BIOC 301. Mutually Exclusive: Cannot register for BIOC 552 if student has credit for BIOC 482.

**BIOC 555 - COMPUTATIONAL SYNTHETIC BIOLOGY**

**Short Title:** COMP SYNTH BIOLOGY  
**Department:** Biosciences  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Graduate level students.  
**Course Level:** Graduate  
**Description:** Mathematical and computational techniques of cell biology and synthetic biology. Topics include deriving and implementing mathematical and computational models of cellular growth and division, evolution, gene regulation, synthetic gene circuits, enzymatic processing, and stochastic processes in biology. Graduate/Undergraduate Equivalency, BIOC 455.

**BIOC 558 - INTRODUCTION TO GENOME EDITING AND ENGINEERING**

**Short Title:** GENOME EDITING AND ENGINEERING  
**Department:** Biosciences  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Graduate level students.  
**Course Level:** Graduate  
**Description:** This course provides an introduction to the recent advances in the genome editing and engineering field. Past and current stages of genome-editing technologies, the fundamental mechanisms of different classes of genome-editing proteins, and cutting-edge strategies for engineering novel genome-editing agents and their applications in synthetic biology and therapeutics. Cross-list: CHBE 558.

**BIOC 560 - CANCER BIOLOGY**

**Short Title:** CANCER BIOLOGY  
**Department:** Biosciences  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Graduate level students.  
**Course Level:** Graduate  
**Description:** Provides an integrated lecture series summarizing current knowledge in cancer biology and integrating current literature with basic concepts. Topics include: statistics of incidence/survival, types of cancer, pathology, the process of carcinogenesis and sources of carcinogens, genetic and epigenetic mechanisms and consequences, cancer progression, metastasis and current treatment options. Students will learn to use online databases to develop independent strategies for analyzing datasets. There will be several writing assignments and in class oral presentations of research articles. This course requires instructor permission to enroll. Please fill out the special registration form from https://registrar.rice.edu/student/special_registration. All requests will be reviewed and you will be notified of an enrollment decision. Instructor Permission Required. Cross-list: BIOE 560. Graduate/Undergraduate Equivalency: BIOC 460. Mutually Exclusive: Cannot register for BIOC 560 if student has credit for BIOC 460.

**BIOC 570 - COMPUTATION WITH BIOLOGICAL DATA**

**Short Title:** COMPUTATION WITH BIOL DATA  
**Department:** Biosciences  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Enrollment is limited to Graduate level students.  
**Course Level:** Graduate  
**Description:** This course will teach programming and analysis techniques essential for modern research in the biological sciences. Students will learn the basics of programming in the MATLAB or Python scripting languages and applications to analyzing biological data. There will be a particular focus on quantitative image and sequence analysis. Instructor Permission Required. Graduate/Undergraduate Equivalency: BIOC 470. Mutually Exclusive: Cannot register for BIOC 570 if student has credit for BIOC 470.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Short Title</th>
<th>Department</th>
<th>Grade Mode</th>
<th>Course Type</th>
<th>Credit Hours</th>
<th>Restrictions</th>
<th>Course Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 571</td>
<td>GRADUATE SEMINAR IN BIOCHEMISTRY AND CELL BIOLOGY</td>
<td>GRAD SEM BIOCHEM &amp; CELL BIOL</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Seminar</td>
<td>1</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>A discussion of selected research topics. Required of all Biochemistry and Cell Biology graduate students. Open only to BCB graduate students. Repeatable for Credit.</td>
</tr>
<tr>
<td>BIOC 572</td>
<td>BIOINFORMATICS: NETWORK ANALYSIS</td>
<td>BIOINFORMATICS: NETWORKS</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Lecture</td>
<td>3</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>This course covers computational aspects of biological network analysis, a major theme in the area of systems biology. The course discusses protein-protein interaction, signaling, metabolic, and functional networks, and covers issues related to constructing, analyzing various types of networks, as well as how they can be used for downstream applications. Cross-list: BIOC 564, COMP 572.</td>
</tr>
<tr>
<td>BIOC 573</td>
<td>IMMUNOLOGY</td>
<td>IMMUNOLOGY</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Lecture</td>
<td>3</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>This course covers computational aspects of biological network analysis, a major theme in the area of systems biology. The course discusses protein-protein interaction, signaling, metabolic, and functional networks, and covers issues related to constructing, analyzing various types of networks, as well as how they can be used for downstream applications. Cross-list: BIOC 564, COMP 572.</td>
</tr>
<tr>
<td>BIOC 574</td>
<td>PROTEIN ENGINEERING</td>
<td>PROTEIN ENGINEERING</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Lecture</td>
<td>3</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Manipulation of gene expression in prokaryotic and eukaryotic cells. Rational design and directed solutions for cell and protein engineering. Selection and screening technologies and process optimization. Synthetic Biology: engineering and application of gene circuits. Molecular biotechnology applications: Diagnosis, Therapeutics and Vaccines. Cross-list: BIOC 580, CHBE 580. Recommended Prerequisite(s): CHBE 310/510 or equivalent is highly recommended.</td>
</tr>
<tr>
<td>BIOC 575</td>
<td>INTRODUCTION TO RESEARCH</td>
<td>INTRODUCTION TO RESEARCH</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Seminar</td>
<td>1</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Introduction of first-year graduate students to the research programs and laboratories of individual faculty members. Open only to BCB graduate students.</td>
</tr>
<tr>
<td>BIOC 576</td>
<td>BIOINFORMATICS: SEQUENCE ANALYSIS</td>
<td>BIOINFORMATICS: SEQUENCE</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Lecture</td>
<td>3</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Pairwise and multiple sequence alignment, Markov chains and HMMs, Phylogenetic reconstruction, Haplotype inference, Computational models of RNA structure, Gene finding, Genome rearrangements, and comparative genomics. Cross-list: COMP 571.</td>
</tr>
<tr>
<td>BIOC 577</td>
<td>BIOTECHNOLOGY PRACTICUM</td>
<td>BIOTECHNOLOGY PRACTICUM</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Internship/Practicum</td>
<td>1</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Computational models of RNA structure, Gene finding, Genome rearrangements, and comparative genomics. Cross-list: COMP 571.</td>
</tr>
<tr>
<td>BIOC 578</td>
<td>BIOTECHNOLOGY PRACTICUM</td>
<td>BIOTECHNOLOGY PRACTICUM</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Internship/Practicum</td>
<td>1</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Computational models of RNA structure, Gene finding, Genome rearrangements, and comparative genomics. Cross-list: COMP 571.</td>
</tr>
<tr>
<td>BIOC 579</td>
<td>BIOTECHNOLOGY PRACTICUM</td>
<td>BIOTECHNOLOGY PRACTICUM</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Internship/Practicum</td>
<td>1</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Computational models of RNA structure, Gene finding, Genome rearrangements, and comparative genomics. Cross-list: COMP 571.</td>
</tr>
<tr>
<td>BIOC 580</td>
<td>PROTEIN ENGINEERING</td>
<td>PROTEIN ENGINEERING</td>
<td>Biosciences</td>
<td>Graduate</td>
<td>Lecture</td>
<td>3</td>
<td>Enrollment is limited to Graduate level students.</td>
<td>Graduate</td>
<td>Manipulation of gene expression in prokaryotic and eukaryotic cells. Rational design and directed solutions for cell and protein engineering. Selection and screening technologies and process optimization. Synthetic Biology: engineering and application of gene circuits. Molecular biotechnology applications: Diagnosis, Therapeutics and Vaccines. Cross-list: BIOC 580, CHBE 580. Recommended Prerequisite(s): CHBE 310/510 or equivalent is highly recommended.</td>
</tr>
</tbody>
</table>
BIOC 583 - MOLECULAR INTERACTIONS
Short Title: MOLECULAR INTERACTIONS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 4
Restrictions: Enrollment is limited to students with a major in Biochemistry and Cell Biology. Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: First of two integrated classes taken by first-year graduate students in BCB (to be followed by BIOC 588, Cellular Interactions). Covers advanced topics in biochemistry, ranging from protein and nucleic acid synthesis, folding, function, and engineering to allostery, dynamics, and degradation with an emphasis on fundamental principles, research methodologies, problem solving, and critical analysis of primary literature. Enrollment limited to BCB graduate students.

BIOC 585 - FUNDAMENTALS OF CELLULAR AND MOLECULAR NEUROSCIENCE
Short Title: FUNDAMENTALS OF NEUROSCIENCE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: Cellular, molecular, and integrative mechanisms of neural function, including membrane and axon physiology, synaptic transmission and plasticity, sensory transduction and processing. Graduate/Undergraduate Equivalency: BIOC 385. Mutually Exclusive: Cannot register for BIOC 585 if student has credit for BIOC 385.

BIOC 587 - RESEARCH DESIGN, PROPOSAL WRITING, AND PROFESSIONAL DEVELOPMENT
Short Title: PROPOSAL WRITING
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: Preparation for professional scientific communication with an emphasis on writing research proposals, describing work in progress, and presenting data in context of research goals.

BIOC 588 - CELLULAR INTERACTIONS
Short Title: CELLULAR INTERACTIONS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 4
Restrictions: Enrollment is limited to students with a major in Biochemistry and Cell Biology. Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: Second of two integrated classes taken by first-year graduate students in BCB (following BIOC 583, Molecular Interactions). Covers advanced topics in genetics, cell biology, and developmental biology, focusing on cellular, tissue, and organismal structure and function with an emphasis on fundamental principles, research methodologies, and critical analysis of primary literature.

BIOC 589 - COMPUTATIONAL MOLECULAR BIOENGINEERING/BIOPHYSICS
Short Title: COMP MOLECULAR BIOENG/BIOPHYS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: This is a course designed for students in computationally-oriented biomedical and bioengineering majors to introduce the principles and methods used for the simulations and modeling of macromolecules of biological interest. Protein conformation and dynamics are emphasized. Empirical energy function and molecular dynamics calculations, as well as other approaches, are described. Specific biological problems are discussed to illustrate the methodology. Cross-list: BIOE 589. Recommended Prerequisite(s): MATH 212, BIOC 301, BIOE 332.

BIOC 590 - SPECIAL TOPICS IN BIOCHEMISTRY AND CELL BIOLOGY
Short Title: SPEC TOPCS BIOCHEM&CELL BIO
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: Development of specific topic areas at the graduate level. Instructor Permission Required.

BIOC 592 - TOPICS IN QUANTITATIVE BIOLOGY AND BIOMEDICAL INFORMATICS (KECK SEMINAR)
Short Title: TOPICS QUANT BIO & BIOMED INFO
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: A discussion of selected research topics in quantitative biology and biomedical informatics. Cross-list: KECK 592. Repeatable for Credit.

BIOC 593 - CURRENT TOPICS IN PLANT BIOLOGY
Short Title: TOPICS IN PLANT BIOLOGY
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Biochemistry and Cell Biology. Enrollment is limited to Graduate level students.

Course Level: Graduate
Description: Discussion of selected research topics in current plant biology literature. Repeatable for Credit.
BIOC 599 - GRADUATE TEACHING IN BIOCHEMISTRY AND CELL BIOLOGY
Short Title: GRADUATE TEACHING IN BIOCHEM
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Independent Study
Credit Hour: 1
Restrictions: Enrollment is limited to students with a major in Biochemistry and Cell Biology. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Supervised instruction in teaching biochemistry and cell biology. Repeatable for Credit.

BIOC 611 - RESEARCH SEMINAR IN BIOCHEMISTRY AND CELL BIOLOGY
Short Title: RESEARCH SEMINAR
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Discussion of individual research or current topics in particular areas. Intended for students conducting research projects in the lab of the instructor. Repeatable for Credit.

BIOC 643 - CELL MECHANICS, MECHANOTRANSDUCTION AND THE CELL MICROENVIRONMENT
Short Title: MECHANOTRANSDUCTION
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Mechanotransduction is a fundamental process essential for living systems and plays a fundamental role in cell signaling, cancer metastasis and stem cell differentiation. Additionally, fundamental biological processes such as endocytosis cell fusion and cell migration are driven by a coordinated interplay of molecular interactions that drive membrane deformation. This course will survey the current understanding of mechanotransduction and the mechanical properties of cells and their microenvironment, including membrane and cytoskeletal mechanics. Experimental approaches for measuring and manipulating the material properties of cells and their environment, including optical, electrical and magnetic techniques will be covered. A variety of application will be covered, including manipulation in engineering of mechanotransduction pathways to drive cell migration and stem cell differentiation. Instructor Permission Required. Cross-list: BIO 643, PHYS 643.

BIOC 677 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Lecture, Seminar, Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Graduate or Visiting Graduate level students.
Course Level: Graduate
Description: Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

BIOC 701 - GRADUATE LAB RESEARCH I
Short Title: GRADUATE LAB RESEARCH I
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 2-4
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Graduate research in Biochemistry and Cell Biology. Designed for short term laboratory projects for first year graduate students. Recommended prerequisite(s): Graduate standing in Biochemistry and Cell Biology. Repeatable for Credit.

BIOC 702 - GRADUATE LAB RESEARCH II
Short Title: GRADUATE LAB RESEARCH II
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 2-4
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Graduate research in Biochemistry and Cell Biology. Designed for short term laboratory projects for first year graduate students. Recommended prerequisite(s): Graduate standing in Biochemistry and Cell Biology. Repeatable for Credit.

BIOC 800 - BIOCHEMISTRY & CELL BIOLOGY GRADUATE RESEARCH
Short Title: BCB GRADUATE RESEARCH
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-15
Restrictions: Enrollment is limited to students with a major in Biochemistry and Cell Biology. Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

Ecology and Evolutionary Biology (EBIO)
EBIO 110 - INTRODUCTION TO RESEARCH
Short Title: INTRODUCTION TO RESEARCH
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-5
Restrictions: Enrollment is limited to Undergraduate or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This course is only for visiting high school juniors and seniors and undergraduates conducting research for the first time. The students will conduct scientific research in the laboratories of the Rice faculty in the areas of Biochemistry & Cell Biology and Ecology & Evolutionary Biology. During the five-week course, students will engage in full time research and will be mentored by experienced researchers under the supervision of Rice faculty. Participating students will also receive formal instruction on the basics of scientific research and innovation. Visiting high school students and undergraduates must complete visiting student application process. Instructions to do this can be found in the Application Checklist at summer.rice.edu. Instructor Permission Required. Repeatable for Credit.
EBIO 113 - ENVIRONMENTAL CRISIS SEMINAR
Short Title: ENVIRONMENTAL CRISIS SEMINAR
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This 7-week seminar course introduces Rice students to a broad range of topics within environmental science, with an emphasis on the role of social responsibility in solving present-day crises. Class has required meetings outside of regular class time. An emphasis is placed on learning and applying ecological principles to the practice of community agriculture. Class has required meetings outside of regular class time.

EBIO 119 - FRESHMAN SEMINAR IN LOCAL BIOLOGY RESEARCH (EEB)
Short Title: FRESHMAN BIOLOGY SEMINAR (EEB)
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: A seminar course to introduce freshmen prospective biology majors to the excitement of research at Rice and the Medical Center and to provide context with which to think about facts presented in biosciences textbooks. 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. In the final session, the group will tour the lab that produced the featured article. Additional tours and activities TBA. All first-year, non-transfer students are eligible to enroll in EBIO 119 regardless of AP credit. This course meets in the first half of the semester and features research in the Program of Ecology and Environmental Biology. Mutually Exclusive: Cannot register for EBIO 119 if student has credit for EBIO 116/FSEM 116.

EBIO 124 - INTRODUCTION TO ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: INTRO TO EEB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This course provides a short introduction to the science of ecology and evolutionary biology. The topics covered include the mechanisms of evolution, the origin of species, the history of life on earth, biodiversity, animal behavior, population and community ecology, ecosystems, and conservation biology.

EBIO 202 - INTRODUCTORY BIOLOGY II
Short Title: INTRODUCTORY BIOLOGY II
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: 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.

EBIO 204 - ENVIRONMENTAL SUSTAINABILITY: THE DESIGN & PRACTICE OF COMMUNITY AGRICULTURE
Short Title: COMMUNITY GARDEN
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: The course introduces the fundamentals of community garden design and practice. Responsibilities will center on developing and improving the Rice Community Garden. A strong emphasis will be on learning and applying ecological principles to the practice of community agriculture. Class has required meetings outside of regular class time.

EBIO 210 - INTRODUCTION TO RESEARCH
Short Title: INTRODUCTION TO RESEARCH
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Research
Credit Hours: 1-5
Restrictions: Enrollment is limited to Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This course is only for Rice students conducting research for the first time. The students will conduct scientific research in the laboratories of the Rice faculty in the areas of Biochemistry & Cell Biology and Ecology & Evolutionary Biology. During the five-week course, students will engage in full-time research and will be mentored by experienced researchers under the supervision of Rice faculty. Participating students will also receive formal instruction on the basics of scientific research and innovation. Rice students will need a special registration from or ask the faculty member for permission to register. Instructor Permission Required. Cross-list: BIOC 210. Repeatable for Credit.
EBIO 213 - INTRO EXPERIMENTAL ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: INTRO EXP ECOL & EVOL BIOL
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Experimental, laboratory, and field studies of natural history, ecology, evolution, and animal behavior. Class has required meetings outside of regular class time. Distribution Credit for EBIO 213 no longer eligible beginning Fall 2019.

EBIO 215 - BIOS LAB TEACHING
Short Title: BIOS LAB TEACHING
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 1-3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Undergraduate teaching in a biosciences laboratory. Participate in meetings and selected seminars; supervise students in one or more laboratory sections. Provide group and individual instruction to undergraduates during and outside of laboratory classes. Instructor Permission Required. Repeatable for Credit.

EBIO 216 - DISCUSSION SECTION TEACHING
Short Title: DISCUSSION SECTION TEACHING
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Independent Study
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: In this course, undergraduates who have previously excelled in EBIO courses will develop teaching skills by leading discussion sections for the benefit of students presently taking EBIO courses under the guidance of the professor teaching the course. Instructor Permission Required.

EBIO 238 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar, Lecture, Laboratory, Internship/Practicum
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

EBIO 270 - ECOSYSTEM MANAGEMENT
Short Title: ECOSYSTEM MANAGEMENT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: This course will focus on applied ecosystem topics including relations with state and federal agencies, filed studies, wetland delineations, permitting compliance, and environmental regulations. Graduate/Undergraduate Equivalency: EBIO 570. Mutually Exclusive: Cannot register for EBIO 270 if student has credit for EBIO 570.

EBIO 280 - SUSTAINABLE DEVELOPMENT AND REPORTING
Short Title: SUSTAINABLE DEVELOPMENT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Lower-Level
Description: Sustainable development is an approach to development based on interacting social, economic, and environmental forces. It is intended as methodology for planning, and a guiding principle for Environmental Health and safety compliance (EHSs) and Corporate Sustainability (CSRs). Students will learn compliance guidelines, risk management, and assessment considerations. Graduate/Undergraduate Equivalency: EBIO 580. Mutually Exclusive: Cannot register for EBIO 280 if student has credit for EBIO 580.

EBIO 306 - INDEPENDENT RESEARCH FOR ECOLOGY & EVOLUTIONARY BIOLOGY UNDERGRADUATES
Short Title: EEB UNDERGRADUATES IND RES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 1-3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 213
Description: Program of independent research for students with previous training in the biosciences. Includes a research paper. Students are expected to spend at least three hours per week in the laboratory for each semester hour of credit. If receiving two or more credits, students will be required to participate in the university annual undergraduate symposium in the spring semesters. Instructor Permission Required. Repeatable for Credit.
EBIO 316 - LAB MODULE IN ECOLOGY
Short Title: LAB MODULE IN ECOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 323 or EBIO 325
Description: Field and lab experiments in ecology. Class has required meetings outside of regular class time.

EBIO 317 - LAB MODULE IN BEHAVIOR
Short Title: LAB MODULE IN BEHAVIOR
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 321 and EBIO 213
Description: Field experiments in behavior. Learn to formulate and test hypotheses on bird behavior using mockingbirds, grackles, and herons nesting on campus. Class has required meetings outside of regular class time.

EBIO 319 - TROPICAL FIELD BIOLOGY
Short Title: TROPICAL FIELD BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Examine first-hand the two most diverse ecosystems on earth - the coral reef and the tropical rainforest in this 2-week summer course in the Central American country of Belize. Topics will include the diversity of tropical organisms and habitats, the formation of coral reefs, rainforest ecology, historical biogeography, symbiosis, and conservation of tropical biodiversity. While a background in biology is desirable, individuals lacking this background but having a special interest in the tropics are encouraged to enroll. Students will be responsible for their own transportation and accommodation cost (exact price TBD). Distribution Credit for EBIO 319 no longer eligible beginning Fall 2019. Instructor Permission Required.

EBIO 320 - ECOLOGY AND CONSERVATION OF BRAZILIAN WETLANDS LABORATORY
Short Title: BRAZILIAN WETLANDS LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: This course consists of a 2-week trip to Brazil to examine first-hand the ecology of the largest wetland ecosystem on earth - the Pantanal. Days will be spent in the field making observations and collecting data; lectures in the evenings will cover topics including freshwater ecology, seasonal flooding dynamics, community ecology of wetland species, symbiosis, geology, environmental management, ecotourism, and conservation biology. Distribution Credit for EBIO 320 no longer eligible beginning Fall 2019. Recommended Prerequisite(s): EBIO 213

EBIO 321 - ANIMAL BEHAVIOR
Short Title: ANIMAL BEHAVIOR
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Description: Evolutionary theory is used to evaluate behavioral adaptations of organisms to their environment.

EBIO 323 - CONSERVATION BIOLOGY
Short Title: CONSERVATION BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Description: The course is designed to give students a broad overview of conservation biology. Lecture and discussions will focus on conservation issues such as biodiversity, extinction, management, sustained yield, invasive species and preserve design. Cross-list: ENST 323. Graduate/Undergraduate Equivalency: EBIO 523. Mutually Exclusive: Cannot register for EBIO 323 if student has credit for EBIO 523.
EBIO 324 - CONSERVATION BIOLOGY LAB
Short Title: CONSERVATION BIOLOGY LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 213 and EBIO 323 (may be taken concurrently)
Description: This course will give students hands-on experiences in the practice of conservation biology through authentic projects related to prioritization and design of nature preserves, restoration of natural environments, and for monitoring threatened and endangered species in the Houston area. EBIO 323 may be taken concurrently with EBIO 324. Graduate/Undergraduate Equivalency: EBIO 524. Mutually Exclusive: Cannot register for EBIO 324 if student has credit for EBIO 524.

EBIO 325 - ECOLOGY
Short Title: ECOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Description: Study of population dynamics, species interactions, plant and animal community organization, and ecosystem function. Graduate/Undergraduate Equivalency: EBIO 525. Mutually Exclusive: Cannot register for EBIO 325 if student has credit for EBIO 525.

EBIO 326 - INSECT BIOLOGY
Short Title: INSECT BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 or EBIO 202
Description: This course addresses contemporary issues in ecology and evolution through the lens of insect diversity. Readings span a broad literature (popular to technical). Writing and oral reports develop proficiency in scientific communication.

EBIO 327 - BIOLOGICAL DIVERSITY
Short Title: BIOLOGICAL DIVERSITY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202 and EBIO 213
Description: The lecture/laboratory course in field ecology focuses on the theory and practice of estimating biodiversity. The goals are to acquaint students with basic techniques for field sampling and quantifying biodiversity as well as some aspects of the natural history of south and east Texas. These will be accomplished through four field trips during the first half of the semester and an independent research project to be completed by the end of the semester. Class has required meetings outside of regular class time.

EBIO 328 - EVOLUTION OF GENES & GENOMES
Short Title: EVOLUTION OF GENES & GENOMES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Description: The course provides an overview of the evolution of genes and genomes. Using many examples, the course introduces databases and the Worldwide Web, and molecular and statistical methods used to study the evolution of genes and genomes. Broad-scale evolutionary patterns and medical applications based on genome analyses are presented.

EBIO 329 - ANIMAL BIOLOGY AND PHYSIOLOGY
Short Title: ANIMAL BIOLOGY AND PHYSIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 or EBIO 202
Description: The evolution and systematics of the animal kingdom with consideration of functional anatomy, comparative physiology, behavior, medical implications and resource management. Cross-list: BIOC 329. Graduate/Undergraduate Equivalency: EBIO 529. Mutually Exclusive: Cannot register for EBIO 329 if student has credit for EBIO 529.
EBIO 330 - INSECT BIOLOGY LAB
Short Title: INSECT BIOLOGY LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202 and EBIO 213 and EBIO 326 (may be taken concurrently)
Description: Lectures will address contemporary issues in ecology and evolution through the lens of insect diversity. Labs will provide hands-on experiences with collection and curation of insects.

EBIO 331 - BIOLOGY OF INFECTIOUS DISEASES
Short Title: BIOLOGY OF INFECTIOUS DISEASES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 213
Description: This course gives a broad overview of the biology of infectious diseases using examples from humans, plants, and animals. Topics include diversity of diseases, mechanisms of disease transmission, epidemiology, population regulation, evolution of virulence, disease dynamics in natural communities and disease invasion and conservation biology. Cross-list: BIOC 331.

EBIO 332 - EVOLUTION OF GENES & GENOMES LAB
Short Title: EVOLUTION GENES & GENOMES LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 328
Description: The laboratory course is designed to demonstrate concepts and approaches introduced in the lecture course EBIO 328. The text book remains the same, but the course will heavily rely on the computational exercises provided in the text (called Weblems). Students will be shown how to conduct analysis of sequence data, search databases, literature, and how to synthesize such data. Students will conduct their own projects, some suggested by the text, some by the instructor, some perhaps ideas of their own. Students present and defend their results in writing and in form of presentations and posters. The course would be useful for graduate student education, with added requirements for graduate students.

EBIO 333 - EVOLUTIONARY BIOINFORMATICS LAB
Short Title: EVOLUTIONARY BIOINFORMATICS LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 333 (may be taken concurrently) or COMP 370 (may be taken concurrently)
Description: Computer lab section for Evolutionary Bioinformatics. Students must enroll in EBIO 333.
EBIO 337 - FIELD BIRD BIOLOGY LAB
Short Title: FIELD BIRD BIOLOGY LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 213
Description: This course centers on a series of five field trips to diverse habitats for observing birds both immigrants and residents. Each will be preceded by a lecture and students will do two projects. Class has required meetings outside of regular class time. Distribution Credit for EBIO 337 no longer eligible beginning Fall 2019.

EBIO 338 - ANALYSIS AND VISUALIZATION OF BIOLOGICAL DATA
Short Title: BIO DATA ANALYSIS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 213 or BIOC 211 or BIOC 212
Description: This course addresses how to analyze, visualize and draw conclusions from biological data. It introduces basic concepts in statistics interwoven with training in data analysis using the R computing environment. Students will learn to identify underlying data structures and wrangle data. Students will also learn to effectively convey results using statistical graphics. Topics include basic R programming, data exploration, statistical modeling, parameter estimation and interpretation, and model comparison. This class particularly focuses on biological data. Graduate/Undergraduate Equivalency: EBIO 538.

EBIO 340 - GLOBAL BIOGEOCHEMICAL CYCLES
Short Title: GLOBAL BIOGEOCHEMICAL CYCLES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 213 or BIOC 211 or BIOC 212
Description: This course introduces students to the coupled nature of the biosphere, atmosphere and hydrosphere using as focal points elemental cycles such as those of carbon and nitrogen. This is a writing-intensive class, and will include 3 required Saturday field trips. Cross-list: ENST 340, ESCI 340. Graduate/Undergraduate Equivalency: EBIO 540. Mutually Exclusive: Cannot register for EBIO 340 if student has credit for EBIO 540.

EBIO 365 - INTRODUCTORY PHYCOLOGY
Short Title: INTRODUCTORY PHYCOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Description: This course provides an overview of the biology of algae including their physiology, taxonomy, biochemistry, and ecology. Students will study the role of algae in different environments, their importance as primary producers, and their economic value.

EBIO 366 - APPLIED PHYCOLOGY
Short Title: APPLIED PHYCOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Description: This course provides an overview of methods of algal strain selection and cultivation for food, fodder, fertilizers, biofuels, pharmaceuticals, and cosmetics. Graduate/Undergraduate Equivalency: EBIO 566. Mutually Exclusive: Cannot register for EBIO 366 if student has credit for EBIO 566.

EBIO 367 - INTRODUCTION PHYCOLOGY LAB
Short Title: INTRODUCTION PHYCOLOGY LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Corequisite: EBIO 365
Description: This lab course provides an introduction to techniques of isolation, culturing, measuring of growth and identification of algae.

EBIO 368 - APPLIED PHYCOLOGY LAB
Short Title: APPLIED PHYCOLOGY LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202
Corequisite: EBIO 366
Description: In this course students will learn methods of algal strain selection and mass cultivation together with analyses of algal characteristics including their lipid composition, enzymes and pigments.
EBIO 372 - CORAL REEF ECOSYSTEMS
Short Title: CORAL REEF ECOSYSTEMS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): EBIO 202
Description: This three credit lecture course introduces students to a complex, dynamic and sensitive ecosystem: coral reefs. We will explore the biotic and abiotic components of coral reefs; how reef organisms interact with each other and the environment, and the factors that contribute to reef construction and decline over time and space.
Graduate/Undergraduate Equivalency: EBIO 572. Mutually Exclusive: Cannot register for EBIO 372 if student has credit for EBIO 572.

EBIO 379 - LAB MODULE IN AQUATIC ECOLOGY WITH SCUBA
Short Title: LAB MOD AQU ECOLOGY WITH SCUBA
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Students will learn some fundamentals of aquatic ecosystems and conduct lab exercises that involve SCUB-based fieldwork in a nationally recognized freshwater dive site. Course has required meetings outside of regular class time. Prerequisites: LPAP 194 or proof of Open Water Scuba certification from a professional organization (e.g., PADI, NAUI). A course fee ranging from $300 to $535 is associated with the class. Please send all enrollment requests to Mariah McClarty, mam22@rice.edu and include the following information: major, year, scuba certification level and issuing professional organization, and a brief statement about why you want to take the course. You will be notified of enrollment decisions by December 5th. Distribution Credit for ENST/EBIO 379 no longer eligible beginning Fall 2019. Department Permission Required. Cross-list: ENST 379. Graduate/Undergraduate Equivalency: EBIO 572. Recommended Prerequisite(s): EBIO 213 and LPAP 194. Mutually Exclusive: Cannot register for EBIO 379 if student has credit for EBIO 579.

EBIO 391 - TRANSFER CREDIT IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: TRAN CREDIT ECOL&EVOLUTION
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Transfer
Credit Hours: 3
Course Level: Undergraduate Upper-Level
Description: For transfer of courses which have no current equivalent in the Rice curriculum, but which can be counted as Group B Biosciences courses in satisfying requirements for majors in the Biosciences. Repeatable for Credit.

EBIO 393 - LABORATORY TRANSFER CREDIT IN BIOSCIENCES
Short Title: LAB TRANSFER CREDIT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Transfer
Credit Hour: 1
Course Level: Undergraduate Upper-Level
Description: For transfer of an advanced laboratory course in the biosciences that has no current equivalent in the Rice Biosciences curriculum. Any student may receive a maximum of one credit of EBIO 393.

EBIO 403 - UNDERGRADUATE HONORS RESEARCH IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: UNDERGRADUATE HONORS RESEARCH
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 5
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Open only to undergraduate majors who meet specific requirements and with permission of the research supervisor and chair. Registration for EBIO 403/404 implies a commitment to participate in research for at least 2 semesters. Department Permission Required.

EBIO 404 - UNDERGRADUATE HONORS RESEARCH IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: UNDERGRADUATE HONORS RESEARCH
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 5
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Open only to undergraduate majors who meet specific requirements and with permission of the research supervisor and chair. Registration for EBIO 403/404 implies a commitment to participate in research for at least 2 semesters. Department Permission Required.

EBIO 412 - ADVANCED COMMUNICATION IN THE BIOLOGICAL SCIENCES
Short Title: ADV COMMUNICATION IN BIOL SCI
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 2
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Intended primarily for seniors majoring in the biological sciences, this course will focus on improving students' written and oral communication skills. Emphasis will be placed on communication of scientific topics for audiences ranging from experts to the general public through weekly assignments. Instructor Permission Required. Repeatable for Credit.
EBIO 433 - ADVANCED ECOLOGY
Short Title: ADVANCED ECOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Prerequisite(s): BIOC 201 and EBIO 202 and EBIO 325
Description: Students will develop a critical understanding of the discipline of ecology through a combination of lectures and discussion that span a range of topics. With the instructor's help, students will use current papers to stimulate debate on the theories, philosophies and methods of the study of populations, communities, and ecosystems. Instructor Permission Required.

EBIO 477 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar, Lecture, Laboratory, Internship/Practicum
Credit Hours: 1-4
Restrictions: Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: Topics and credit hours vary each semester. Contact department for current semester's topic(s). Repeatable for Credit.

EBIO 495 - SEMINAR: TOPICS IN ENVIRONMENTAL SCIENCE
Short Title: TOPICS: ENVIRONMENTAL SCIENCE
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hours: 3
Restrictions: Enrollment limited to students with a class of Senior. Enrollment is limited to Undergraduate, Undergraduate Professional or Visiting Undergraduate level students.
Course Level: Undergraduate Upper-Level
Description: This course provides an integration of interdisciplinary topics that span environmental sciences. Topics will vary depending upon the interests and needs of both students and faculty. Only Seniors may register for this course without instructor permission. Cross-list: ESCI 495.

EBIO 520 - STUDENT SEMINAR IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: STUDENT SEMINAR IN EEB
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Student-led presentations of work in progress, research ideas, and topics of research interest. Designed to enhance oral presentation skills and facilitate discussion of research ideas. Open to upper-level undergraduates and graduate students. Recommended Prerequisite(s): Graduate Status or current enrollment in EBIO 403. Repeatable for Credit.

EBIO 523 - CONSERVATION BIOLOGY
Short Title: CONSERVATION BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): (BIOC 201 and EBIO 202) (EBIO 213 and EBIO 323 (may be taken concurrently))
Description: This course will give students hands-on experiences in the practice of conservation biology through authentic projects related to prioritization and design of nature preserves, restoration of natural environments, and for monitoring threatened and endangered species in the Houston area. Prereq EBIO 323 may be taken concurrently. Graduate/Undergraduate Equivalency: EBIO 324. Mutually Exclusive: Cannot register for EBIO 524 if student has credit for EBIO 324.

EBIO 524 - CONSERVATION BIOLOGY LAB
Short Title: CONSERVATION BIOLOGY LAB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): (EBIO 213 and EBIO 323) (may be taken concurrently)
Description: This course will give students hands-on experiences in the practice of conservation biology through authentic projects related to prioritization and design of nature preserves, restoration of natural environments, and for monitoring threatened and endangered species in the Houston area. Prereq EBIO 323 may be taken concurrently. Graduate/Undergraduate Equivalency: EBIO 324. Mutually Exclusive: Cannot register for EBIO 524 if student has credit for EBIO 324.

EBIO 525 - ECOLOGY
Short Title: ECOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): (BIOC 201 and EBIO 202)
Description: Study of population dynamics, species interactions, plant and animal community organization, and ecosystem function. Graduate/Undergraduate Equivalency: EBIO 325. Mutually Exclusive: Cannot register for EBIO 525 if student has credit for EBIO 325.

EBIO 529 - ANIMAL BIOLOGY AND PHYSIOLOGY
Short Title: ANIMAL BIOLOGY AND PHYSIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): BIOC 201 or EBIO 202
Description: The evolution and systematics of the animal kingdom with consideration of functional anatomy, comparative physiology, behavior, medical implications and resource management. Graduate/Undergraduate Equivalency: EBIO 329. Mutually Exclusive: Cannot register for EBIO 529 if student has credit for BIOC 329/EBIO 329.
EBIO 534 - EVOLUTION
Short Title: EVOLUTION
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Principles of biological evolution. Topics include natural selection, adaptation, molecular evolution, formation of new species, the fossil record, biogeography, and principles of classification. Instructor Permission Required. Cross-list: BIOC 534. Graduate/Undergraduate Equivalency. EBIO 334. Mutually Exclusive: Cannot register for EBIO 534 if student has credit for EBIO 334.

EBIO 530 - ANALYSIS AND VISUALIZATION OF BIOLOGICAL DATA
Short Title: BIO DATA ANALYSIS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): EBIO 213 or BIOC 211 or BIOC 212
Description: This course addresses how to analyze, visualize and draw conclusions from biological data. It introduces basic concepts in statistics intertwined with training in data analysis using the R computing environment. Students will learn to identify underlying data structures and wrangle data. Students will also learn to effectively convey results using statistical graphics. Topics include basic R programming, data exploration, statistical modeling, parameter estimation and interpretation, and model comparison. This class particularly focuses on biological data. Graduate/Undergraduate Equivalency: EBIO 338.

EBIO 540 - GLOBAL BIOGEOCHEMICAL CYCLES
Short Title: GLOBAL BIOGEOCHEMICAL CYCLES
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course introduces students to the coupled nature of the biosphere, atmosphere and hydrosphere using as focal points elemental cycles such as those of carbon and nitrogen. This is a writing-intensive class, and will include 3 required Saturday field trips. Graduate/Undergraduate Equivalency: EBIO 340. Mutually Exclusive: Cannot register for EBIO 540 if student has credit for EBIO 340.

EBIO 542 - RESEARCH SEMINAR IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: RESEARCH SEMINAR
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

EBIO 554 - CURRENT TOPICS IN WOLF CONSERVATION
Short Title: WOLF CONSERVATION
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course will provide an overview of the biology of wolves, their effects on ecosystems, the history of their management, and the current state of their conservation in the United States. Instructor Permission Required.

EBIO 560 - SUSTAINABILITY IMPACT ASSESSMENTS
Short Title: SUSTAINABILITY IMPACTS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course is an exciting review of the methodologies involved in conducting Environmental Impact Assessments according to epistemologies from Sustainable Development. EIAs have to be conducted, before permitting is secured, for large projects and programs; such as power plants, highways, pipelines, dams, mines, airports, incinerators and landfills. Most environmental consultancies and government environmental offices will routinely engage experts who are familiar with a comprehensive assessment of local ecosystems around a project or program.
Course URL: profms.rice.edu (http://profms.rice.edu)

EBIO 561 - TOPICS IN EVOLUTION
Short Title: TOPICS IN EVOLUTION
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Review and discussion of the literature on current research in evolution. Repeatable for Credit.
EBIO 562 - TOPICS IN BEHAVIORAL BIOLOGY
Short Title: TOPICS IN BEHAVIORAL BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Review and discussion of the literature on current research in animal behavior and evolution. Recommended prerequisite(s): Graduate standing or permission of chair or instructor. Repeatable for Credit.

EBIO 563 - TOPICS IN ECOLOGY
Short Title: TOPICS IN ECOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Review and discussion of the literature on current research in ecology. Repeatable for Credit.

EBIO 566 - APPLIED PHYCOLOGY
Short Title: APPLIED PHYCOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course provides an overview of methods of algal strain selection and cultivation for food, fodder, fertilizers, biofuels, pharmaceuticals, and cosmetics. Graduate/Undergraduate Equivalency: EBIO 366. Mutually Exclusive: Cannot register for EBIO 566 if student has credit for EBIO 366.

EBIO 568 - TOPICS IN BIOLOGICAL DIVERSITY
Short Title: TOPICS IN BIOLOGICAL DIVERSITY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Review and discussion of literature on current research in biological diversity. Repeatable for Credit.

EBIO 569 - CORE COURSE IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: CORE COURSE IN ECOLOGY & EVOL
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Survey of topics in ecology and evolution taught by all EEB faculty.

EBIO 570 - ECOSYSTEM MANAGEMENT
Short Title: ECOSYSTEM MANAGEMENT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course will focus on applied ecosystem topics including relations with state and federal agencies, field studies, wetland delineations, permitting compliance, and environmental regulations. Graduate/Undergraduate Equivalency: EBIO 270. Mutually Exclusive: Cannot register for EBIO 570 if student has credit for EBIO 270.

EBIO 572 - CORAL REEF ECOSYSTEMS
Short Title: CORAL REEF ECOSYSTEMS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Prerequisite(s): EBIO 202
Description: This three credit lecture course introduces students to a complex, dynamic and sensitive ecosystem: coral reefs. We will explore the biotic and abiotic components of coral reefs; how reef organisms interact with each other and the environment, and the factors that contribute to reef construction and decline over time and space. Graduate/Undergraduate Equivalency: EBIO 372. Mutually Exclusive: Cannot register for EBIO 572 if student has credit for EBIO 372.

EBIO 579 - LAB MODULE IN AQUATIC ECOLOGY WITH SCUBA
Short Title: LAB MOD AQU ECOLOGY WITH SCUBA
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Laboratory
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Students will learn some fundamentals of aquatic ecosystems and conduct lab exercises that involve SCUBA-based fieldwork in a nationally recognized freshwater dive site. Course has required meetings outside of regular class time. Prerequisites: LPAP 194 or proof of Open Water Scuba certification from a professional organization (e.g., PADI, NAUI). A course fee ranging from $300 to $535 is associated with the class. Please send all enrollment requests to Mariah McClarty, mam22@rice.edu. You will be notified of enrollment decisions by December 5th. Department Permission Required. Graduate/Undergraduate Equivalency: EBIO 379. Recommended Prerequisite(s): EBIO 213 and LPAP 194. Mutually Exclusive: Cannot register for EBIO 579 if student has credit for EBIO 379.
EBIO 580 - SUSTAINABLE DEVELOPMENT AND REPORTING
Short Title: SUSTAINABLE DEVELOPMENT
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Sustainable development is an approach to development based on interacting social, economic, and environmental forces. It is intended as methodology for planning, and a guiding principle for Environmental Health and safety compliance (EHSs) and Corporate Sustainability (CSRs). Students will learn compliance guidelines, risk management, and assessment considerations. Graduate/Undergraduate Equivalency: EBIO 280. Mutually Exclusive: Cannot register for EBIO 580 if student has credit for EBIO 280.

EBIO 581 - EEB OUTREACH DEVELOPMENT
Short Title: EEB OUTREACH DEVELOPMENT
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: This course is for Rice students interested in developing life science outreach initiatives that target underserved K-12 students in the Houston area. Goals of the course include developing hands-on teaching modules related to Texas science education standards and expanding graduate student teaching experiences beyond the University setting.

EBIO 585 - GRADUATE SEMINAR IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: GRAD SEM IN ECOL & EVOL BIOL
Department: Biosciences
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Faculty and student presentations on current research. Required of all Ecology & Evolutionary Biology graduate students. Repeatable for Credit.

EBIO 586 - GRADUATE SEMINAR/ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: GRAD SEM: ECOL & EVOL BIOLOGY
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Continuation of EBIO 585. Repeatable for Credit.

EBIO 591 - GRADUATE TEACHING IN ECOLOGY AND EVOLUTIONARY BIOLOGY
Short Title: GRADUATE TEACHING IN EEB
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Internship/Practicum
Credit Hours: 3
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

EBIO 677 - SPECIAL TOPICS
Short Title: SPECIAL TOPICS
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Internship/Practicum, Lecture, Seminar, Laboratory
Credit Hours: 1-4
Restrictions: Enrollment is limited to Graduate or Visiting Graduate level students.
Course Level: Graduate
Description: Topics and credit hours vary each semester. Contact department for current semester’s topic(s). Repeatable for Credit.

EBIO 801 - EEB GRADUATE RESEARCH
Short Title: EEB GRADUATE RESEARCH
Department: Biosciences
Grade Mode: Standard Letter
Course Type: Research
Credit Hours: 1-15
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: Repeatable for Credit.

Description and Code Legend
Note: Internally, the university uses the following descriptions, codes, and abbreviations for this academic program. The following is a quick reference:

Course Catalog/Schedule
• Course offerings/subject code for Biochemistry and Cell Biology: BIOC
• Course offerings/subject code for Ecology and Evolutionary Biology: EBIO

Department Description and Code
• BioSciences: BIOS

Undergraduate Degree Descriptions and Codes
• Bachelor of Arts degree: BA
• Bachelor of Science degree: BS

Undergraduate Major Descriptions and Codes
• Major in Biochemistry and Cell Biology (for both the BA and BS degrees): BIOC
• Major in Ecology and Evolutionary Biology (for both the BA and BS degrees): EBIO
• Major in Biological Sciences (BA degree only): BIOS

Undergraduate Minor Descriptions and Codes
• Minor in Biochemistry and Cell Biology: BCBM
• Minor in Ecology and Evolutionary Biology: EEBM
Graduate Degree Descriptions and Codes

- Master of Science degree: MS
- Doctor of Philosophy degree: PhD

Graduate Degree Program Descriptions and Codes

- Degree Program in Biochemistry and Cell Biology: BIOC
- Degree Program in Ecology and Evolutionary Biology: EBIO

CIP Code and Description

- **BIOC** Major/Program: CIP Code/Title: 26.0202 - Biochemistry
- **BIOS** Major/Program: CIP Code/Title: 26.0101 - Biology/Biological Sciences, General
- **EBIO** Major/Program: CIP Code/Title: 26.1310 - Ecology and Evolutionary Biology
- **BCBM** Minor: CIP Code/Title: 26.0202 - Biochemistry
- **EEBM** Minor: CIP Code/Title: 26.1310 - Ecology and Evolutionary Biology

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1 Classification of Instructional Programs (CIP) 2010 Codes and Descriptions from the National Center for Education Statistics: [https://nces.ed.gov/ipeds/cipcode/](https://nces.ed.gov/ipeds/cipcode/)