FACULTY CURRICULUM COMMITTEE
SIGNATURE PAGE

• In section A, list ALL of the forms covered by this signature page. If you submit a form that is not listed in A, your proposal will be held back until we receive a new, updated signature page.
• You must obtain the signature of your department chair and dean before submitting your proposal.

A. FORMS COVERED BY THIS SIGNATURE PAGE.
BIOL 356, Course Form
Biology B.S., Change of Major Form
Biology B.S. with Teaching Option, Change of Major Form
Biology B.S. with Concentration in Molecular Biology, Change of Major Form
Biology B.A., Change of Major Form
Biology Minor, Minor Form
Marine Biology B.S., Change of Major Form

B. APPROVAL AND SIGNATURES.

1. Signature of Department Chair or Program Director:
   [Signature]
   Date: 2/19/14

2. Signature of Academic Dean:
   [Signature]
   Date: 2/19/14

3. Signature of Provost:
   [Signature]
   Date: 2/27/14

4. Signature of Business Affairs (only for course fees):
   [Signature]
   Date: ____________________
   □ fee approved on __________
   □ BOT approval pending

5. Signature of Curriculum Committee Chair:
   [Signature]
   Date: ____________________

6. Signature of Budget Committee Chair (only for new programs):
   [Signature]
   Date: ____________________

7. Signature of Academic Planning Committee Chair (only for new programs):
   [Signature]
   Date: ____________________

8. Signature of Faculty Senate Secretary:
   [Signature]
   Date: ____________________

Date Approved by Faculty Senate: ____________________
Tuesday, February 11, 2014

Dear Curriculum Committee,

We would like to request the addition of a new course, BIOL 356: Comparative Biomechanics, to the curriculum as a biology elective for Fall 2014. During the past three years, Comparative Biomechanics has been taught as a special topics course (BIOL 453) during the Fall semesters of 2011, 2012, and 2013.

Included with this cover letter are: a faculty curriculum committee course form, faculty curriculum committee change/delete program forms (Bachelor of Science in Biology, Bachelor of Science in Biology Teaching Option, Bachelor of Science in Biology with Concentration in Molecular Biology, Bachelor of Arts in Biology, Bachelor of Science in Marine Biology, Minor in Biology), catalog entries (Bachelor of Science in Biology, Bachelor of Science in Biology Teaching Option, Bachelor of Science in Biology with Concentration in Molecular Biology, Bachelor of Arts in Biology, Bachelor of Science in Marine Biology, Minor in Biology), a syllabus for BIOL 356, and a faculty curriculum committee signature page. If you have any questions or require additional information, please feel free to contact me, Andrew Clark, at carkaj@cofc.edu or call me at 949-394-6106.

Thank you for your consideration,

Andrew Clark, Ph.D.
Assistant Professor
Department of Biology
College of Charleston

Eric J. McElroy, Ph.D.
Assistant Professor
Department of Biology
College of Charleston

Jason T. Vance, Ph.D.
Assistant Professor
Department of Biology
College of Charleston
FACULTY CURRICULUM COMMITTEE
COURSE FORM

Instructions:
- Please fill out one of these forms for each course you are adding, changing, deactivating, or reactivating.
- Fill out the parts of the form specified in part B. You must do this before your request can move forward!
- Remember that your changes will not be implemented until the next catalog year at the earliest.
- If you have questions, start by checking the instructions on the website. Please feel free to contact the committee chairs with any remaining questions you might have.

A. CONTACT/COURSE INFORMATION.

Name: Andrew Clark  Phone: 843-953-4879  Email: clarkaj@cofc.edu

Department or Program: Biology  School: Science and Mathematics

Subject Acronym and Course Number: BIOL 356

Catalog Year in which changes will take effect: FALL 2014

B. TYPE OF REQUEST. Please check all that apply, then fill out the specified parts of the form.

☐ Add a New Course (complete parts C, D, F, G, H, I, J)
☐ Change Part of an Existing Course (complete parts C, D, E, F, G, I, J)
☐ Course Number (you must submit a course deactivation request for the old course number)
☐ Course Name
☐ Course Description
☐ Credit/Contact Hours
☐ Restrictions (prerequisites, co-requisites, junior/senior standing, etc.)
☐ Deactivate an Existing Course (complete parts C, D, E, G, I, J)
☐ Reactivate a Previously-Deactivated Course (complete parts C, D, E, G, I, J)

C. RATIONALE AND EXPLANATION. Please describe your request and explain why you are making it.

This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Major electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic, terrestrial- and aerial-locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

D. IMPACT ON EXISTING PROGRAMS AND COURSES. Please briefly describe the impact of your request on your own programs and courses as well other programs and courses. If another program requires the course, you must submit their written acknowledgement with this proposal. Also, the affected program must describe any change in the number of credit hours they require. Include a list of similar courses in other departments and explain any overlap.

This form was last updated on 12/13/13 and replaces all others.
Biology:
As a result of this change, students in all programs will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students' progression through their respective degree programs should be enhanced by this experience.

Other Departments: Exercise Science
EXSC 330 Kinesiology and EXSC 440 Biomechanics: Like BIOL 356, both courses apply basic Newtonian physics to biological systems. However, EXSC 330 and 440 focus on motion analysis and biomechanics of human movement, respectively, whereas BIOL 356 focuses on the biomechanics of a broad range of organisms, including unicellular organisms, plants, invertebrates, and vertebrates, as well as a broad range of biomechanical phenomena, including feeding, aquatic, terrestrial, and aerial locomotion, and material properties. EXSC 330 and 440 do not have an associated laboratory component whereas BIOL 356 includes a laboratory component where students will gain experience using state-of-the-art research tools, techniques, and analyses. It is important to note that BIOL 356 is not a course requirement for any of the Exercise Science programs, and, neither EXSC 330 nor 440 are requirements or prerequisites for BIOL 356.

E. EXISTING COURSE INFORMATION. If you are proposing a new course, just leave this blank.
Otherwise, please fill out all fields.
Department: School: Subject Acronym: Course Number:
Credit hours: ___ lecture ___ lab ___ seminar ___ independent study
Contact hours: ___ lecture ___ lab ___ seminar ___ independent study

Course title:
Course description (maximum 50 words, exactly as it appears in the catalog):

Restrictions (pre-requisites, co-requisites, majors only, etc.):

Cross-listing, if any:

Is this course repeatable? □ yes □ no If yes, how many total credit hours may the student earn? ______

F. NEW COURSE INFORMATION. If you are deactivating a course, leave this blank. Otherwise, please fill out all fields. For changed courses, use **boldface** for the information that is changing.

Department: Biology School: SSM Subject Acronym: BIOL Course Number: 356
Credit hours: 3 lecture 1 lab ___ seminar ___ independent study
Contact hours: 3 lecture 3 lab ___ seminar ___ independent study

Course title: Comparative Biomechanics
Course description (maximum 50 words, exactly as it appears in the catalog):

This form was last updated on 12/13/13 and replaces all others.
The study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. Lectures three hours per week; laboratory three hours per week.

Restrictions (pre-requisites, co-requisites, majors only, etc.):
PR: BIOL 111/111L or HONS 151/151L and BIOL 112/112L or HONS 152/152L, and BIOL 211; PR/CO: BIOL 305, MATH 250 and PHYS 101/101L or PHYS 111/111L.

If this is a newly-created course, is it intended to be the equivalent of an existing course? ☐ yes ☒ no
If so, which course? ________________

If equivalent, will the newly-created course replace the existing course? ☐ yes ☐ no

Note: If yes, you must deactivate that course by submitting an additional Course Form.

Cross-listing, if any (submit approval from relevant department): ________________

Note: Cross-listed courses are equivalent.

Is this course repeatable? ☒ yes ☐ no If yes, how many total credit hours may the student earn? __________

Is there an activity, lab, or other fee associated with this course? ☒ yes ☐ no What is the fee? $75 (this is the standard laboratory fee for Biology lab courses).

Note: The Senate cannot approve new fees; Business Affairs will submit any such request to the Board of Trustees. The course can still be created, but the fee will not be attached until the Board has approved it.

G. COSTS. List all of the new costs or cost savings (including new faculty/staff requests, library, equipment, etc.) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CofC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members' research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

H. STUDENT LEARNING OUTCOMES AND ASSESSMENT.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students know and be able to do when they complete the course?</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
<tr>
<td>1. Identify and use the basic vocabulary and mechanical principles of comparative biomechanics.</td>
<td>In-class Examinations Students will be assessed three times throughout the semester, corresponding to each of three subject areas of emphasis. Students should be able to demonstrate mastery of 60% of the vocabulary and mechanical principles to achieve a passing grade. More than 80% of students enrolled in the course should achieve this metric.</td>
</tr>
<tr>
<td>2. Understand the relationship between morphology and biomechanics for a wide range of organisms and relate it to behavior, ecology, and diversity.</td>
<td>In-class Examinations Students will be assessed three times throughout the semester, corresponding to each of three subject areas of emphasis. Students should be able to demonstrate mastery</td>
</tr>
</tbody>
</table>

This form was last updated on 12/13/13 and replaces all others.
of 60% of the structure-function relationships to achieve a passing grade. More than 80% of students enrolled in the course should achieve this metric.

3. Demonstrate an understanding of the scientific method and experimental design.

| Two routes: 1) Written and oral reports of student-designed laboratory experiments and 2) In-class Examinations. For 1) Students will be assessed at least four times during the semester, once for each of three areas of emphasis, and once for a final independent research project. For 2) students will be assessed three times throughout the semester, corresponding to each of three subject areas of emphasis. Students should be able to generate a research question/hypothesis based on an understanding of biomechanical principles, design an experiment based on an understanding of the research equipment, then execute and interpret an experiment to test that hypothesis. A minimum passing grade is earned by meeting the previous statement above with higher grades reflecting more complex and complete thinking regarding scientific methodology and experimentation. More than 80% of students enrolled in the course should achieve this metric. |

4. Continue to develop written, oral, group-work and computational skill sets.

| Two routes: 1) Individual and group-based written and oral reports of student-designed laboratory experiments and 2) In-class Examinations. For 1) Students will be assessed at least four times during the semester, once for each of three areas of emphasis, and once for a final independent research project. For 2) students will be assessed three times throughout the semester, corresponding to each of three subject areas of emphasis. Students should be able to effectively communicate scientific findings in both oral and written formats using appropriate terminology and interpretation of biomechanical principles. Students should be able to use computational skills to analyze and statistically evaluate experimental data (e.g. MATLAB). A minimum passing grade is earned by meeting the previous statement above with higher grades reflecting more refined, skillful, and creative writing/presentation/quantitative skills. More than 80% of students enrolled in the course should achieve this metric. |
The course aligns with the following learning outcomes per each of the following programs/majors, etc. (justification of alignment is indicated by an ®)

GENERAL EDUCATION
1. Acquire basic knowledge of the arts, humanities, mathematics, and the natural and social sciences, the languages which define and convey this knowledge, and the relationship among the branches of knowledge.
   ® See student BIOL 356 learning outcomes 1 and 2 above. Introduced and reinforced from BIOL111 and BIOL112
2. Develop effective reading, writing, and oral communication skills in English, and basic communication skills in a language other than English
   ® See BIOL 356 student learning outcome 4 above. Reinforced from BIOL111 and BIOL112
3. Develop skills in the methods and technologies of inquiry, critical thinking, problem solving, scientific research, quantitative and historical analysis
   ® See BIOL 356 student learning outcome 3 above. Reinforced from BIOL111 and BIOL112
4. Employ the available resources to retrieve, use and evaluate information from a variety of sources
   ® See BIOL 356 student learning outcome 3 above. Part of experimental design involves finding, evaluating and citing relevant primary scientific literature. Reinforced from BIOL111 and BIOL112
5. Develop the ability to set and achieve personal goals
   ® Students must set a goal for the grade they expect and arrange their study habits/work ethic around that goal. Students are routinely advised about this during instructor office hours. Reinforced from BIOL111 and BIOL112
6. Work and interact effectively with others
   ® Laboratory involved group based experiments and communication. Reinforced from BIOL111 and BIOL112
7. Develop intellectual honesty and curiosity, a commitment to lifelong learning, a sense of personal responsibility, and informed, active, responsible citizenship in a climate of civility where dialogue about intellectual debates and controversies can occur.
   ® Laboratory experiments are designed, executed and analyzed by the students, which fosters creativity, curiosity and makes them develop a sense of responsibility with data collection, analysis, and presentation. Laboratories will provide instructors with the opportunity to discuss with students the ethical issues with research, like 1) honesty in the collection, analysis, and presentation of data and 2) care and handling of specimens for experimentation (NOTE – IACUC approval has already been obtained for select species. Instructors teach students the significance of animal care and use protocols, and, will inform the students if specimens under IACUC approval will be used in experiments). Reinforced from BIOL111 and BIOL112.

BIOLOGY (Bachelor of Science in Biology, Bachelor of Science in Biology Teaching Option, Bachelor of Science in Biology with Concentration in Molecular Biology, Bachelor of Arts in Biology, Minor in Biology, and Bachelor of Science in Marine Biology)
1. At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology. ® BIOL 356, at its core, is the study of the structure and function of organisms. Introduced and Reinforced from BIOL111 and BIOL112. This aligns with BIOL 356 student learning outcomes 1 and 2 above.
2. At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology. ® This aligns with BIOL 356 student learning outcomes 1 through 4.
3. At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence ® This aligns with BIOL 356 student learning outcomes 1 through 4.
4. At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods. ® This aligns with BIOL 356 student learning outcome 3 and 4.

I. PROGRAM CHANGES. Will this course be added to the existing degree requirements or list of approved electives of a major, minor, or concentration? ☒ yes ☐ no

This form was last updated on 12/13/13 and replaces all others.
If yes, please attach a Change Minor and/or Change Major/Program Form as appropriate.

J. CHECKLIST.

- I have completed all relevant parts of the form.
- I have attached a cover letter that describes my request and lists all the documents I am submitting.
- (For new courses only) I have attached a syllabus.

☐ N/A   (For courses used in any way by other departments, including cross-listing) I have attached an acknowledgement from the relevant department.

☐ N/A   (For courses intended to fulfill a Gen Ed requirement) I have submitted the proposal to the Gen Ed committee.

- I have submitted one Signature Form that lists all of the different forms I am submitting.
SYLLABUS: BIOL 356/356L. Comparative Biomechanics
Lecture: Tuesday and Thursday, 9:25AM-10:40AM, RHSC 228
Lab: Thursday, 10:50AM-1:50PM, RHSC 300, RHSC 321, RHSC 332, GML or TBA

Instructor: Andrew Clark, Ph.D.
Office location: 332 RHSC
Office phone: 843-953-4879
Office hours: Tuesdays 10:50AM – 12:50PM, or by appointment
Email: clarkaj@cofc.edu
Mailbox: Biology Department Office, 214 RHSC

Textbook: There is no assigned textbook for this course. You will be provided .pdf copies of peer-reviewed primary research and review articles that correspond to the lecture and lab topics.

Course Objectives:
1) Identify and use the basic vocabulary and mechanical principles of comparative biomechanics.
2) Understand the relationship between structure and function for a wide range of organisms and relate it to behavior, ecology, and diversity.
3) Demonstrate an understanding of the scientific method and experimental design.
4) Gain basic proficiency with techniques and equipment used by biomechanists.
5) Continue to develop written, oral, group-work and computational skill sets.

Assessment:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>100</td>
</tr>
<tr>
<td>Exam 2</td>
<td>100</td>
</tr>
<tr>
<td>Exam 3</td>
<td>100</td>
</tr>
<tr>
<td>Post-labs</td>
<td>100</td>
</tr>
<tr>
<td>Problem-sets</td>
<td>150</td>
</tr>
<tr>
<td>Lab reports</td>
<td>150</td>
</tr>
<tr>
<td>Presentation</td>
<td>100</td>
</tr>
<tr>
<td>Participation</td>
<td>100</td>
</tr>
<tr>
<td>Final paper</td>
<td>100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>

Honor system and academic integrity:
Be familiar with the College of Charleston’s Honor System:

http://studentaffairs.cofc.edu/honor-system/

Any form of academic dishonesty will not be tolerated. Unauthorized collaboration between students (working together without permission), giving unauthorized assistance, copying from another student’s quiz, and using an unauthorized study aid are many forms of cheating. Any suspected instance of academic dishonesty will be referred to the Honor Board and can bear serious consequences (e.g. failure in the course plus expulsion).

Special needs:
If you have a documented disability than may require assistance, you will need to contact the Center for Disability Services for coordination in your academic accommodations. If the CDS will be involved in administering an exam, I request that you inform me in advance (e.g. the day before the exam is not acceptable). The CDS is located in the Lightsey Center in Suite 104. The CDS phone number is (843) 953-1431. For more information about disabilities, see http://disabilityservices.cofc.edu.

Attendance:
Attendance is mandatory and will be recorded at the beginning of lecture and lab. All students are expected to arrive on time. If you have a legitimate conflict with a lab or lecture, you must inform me as

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soon as possible and provide an official excuse within five days of the date of your absence. An absence memo alone will not exempt you from the following penalties. An unexcused absence from a lab will result in a zero for that week's post-lab assignment and 5% deducted from your final grade. An unexcused absence from a lecture without prior consent will result in a 1% deducted from your final grade.

Late Assignments:
Assignment grades will be reduced by 10% for each calendar day late. No assignment will be accepted after ten days late. Unless specified otherwise, I will not accept electronic copies of late assignments. Hard copies of late assignments are to be turned into my mailbox, however if the Biology Department office is closed (e.g. after 5 PM on M-F or during the weekend), simply slide your late assignment under my office door. Once dropped off, inform me by email of the assignment's location plus the date and time of the drop-off. You have 24 hours to email me this information after dropping off your late assignment. Failure to contact me and provide me with all of the required information within 24 hours will result in a zero for that assignment.

Exams:
There will be three in-class exams administered this semester. Each exam will be closed book and worth 100 points. Exams will consist of a mixture of problem sets, multiple choice, and short answer questions, and will cover material presented in lecture, unless specified otherwise.

Laboratories:
The lab will begin during the first week of classes. The locations for lab exercises include the research laboratories of Drs. Clark, McElroy and Vance, as well as field locations off-campus; please see the syllabus and announcement on OAKS beforehand. Students are expected to arrive on time and participation is mandatory.

Lab Reports:
There will be three lab reports assigned this semester. Each lab report will be worth 50 points and will be prepared in a format characteristic to published research articles in the field. Your instructor will provide you with detailed guidelines about writing the lab report. Students are expected to prepare lab reports individually.

Presentation:
Each student will deliver a 10-minute oral presentation during the final lab session. Your instructor will provide you with detailed guidelines about this assignment.

Post-lab and problem-set assignments:
You will be required to complete three problem-set assignments and five post-lab assignments this semester. Each post-lab assignment will be worth 20 points, and will require you to analyze and interpret data sets gathered in relevant labs. Each problem-set will be worth 50 points, and will require you to employ skill sets (mathematics, physics, computer software, etc.) to address questions in biomechanics.

Final paper:
We will cover only a fraction of the topics in the field of biomechanics. Therefore, you will be required to choose a topic NOT covered in lecture or lab and complete a written report on that topic. Topic proposals must be submitted to your instructor for approval; this is required to avoid overlap with lecture material. Your instructor will provide you with detailed guidelines about writing the final paper.

PLEASE KEEP YOUR CELL PHONES, LAPTOPS, AND TABLETS OFF DURING LECTURE:
As typed on the bottom of each page in the course syllabus: PLEASE KEEP YOUR CELL PHONES, LAPTOPS, AND TABLETS OFF DURING LECTURE! Whenever a cell phone makes noise (e.g. a noise due to an alarm, incoming call, or text), it is distracting to people trying to listen, take notes, ask questions, take a quiz, take an exam, or even deliver a lecture. The lights and images produced on the screen of a laptop or tablet is also distracting. Neglecting to follow this policy is highly disrespectful to your peers and to your instructor. I implore you to follow this simple rule. Failure to do so may result in your instructor confiscating your cell phone, laptop, or tablet until the end of lecture.

PLEASE KEEP YOUR CELL PHONES, LAPTOPS, AND TABLETS OFF DURING LECTURE!
Lecture Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 21</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aug 23</td>
<td>Units and states of matter</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Aug 28</td>
<td>Scaling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aug 30</td>
<td>Skeletal muscles</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sep 4</td>
<td>Skeletal muscles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sep 6</td>
<td>Terrestrial locomotion</td>
<td>Problem-Set 1 due</td>
</tr>
<tr>
<td>4</td>
<td>Sep 11</td>
<td>Terrestrial locomotion</td>
<td>Post-Lab 1 due</td>
</tr>
<tr>
<td></td>
<td>Sep 13</td>
<td>Terrestrial locomotion</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sep 18</td>
<td>Fluid dynamics</td>
<td>Final paper topic proposals due</td>
</tr>
<tr>
<td></td>
<td>Sep 20</td>
<td>Fluid dynamics</td>
<td>Lab Report 1 due</td>
</tr>
<tr>
<td>6</td>
<td>Sep 25</td>
<td>Exam 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sep 27</td>
<td>Aquatic locomotion</td>
<td>Post-Lab 2 due</td>
</tr>
<tr>
<td>7</td>
<td>Oct 2</td>
<td>Aquatic locomotion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oct 4</td>
<td>Aerial locomotion</td>
<td>Lab Report 2 due</td>
</tr>
<tr>
<td>8</td>
<td>Oct 9</td>
<td>Aerial locomotion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oct 11</td>
<td>Aerial locomotion</td>
<td>Post-Lab 3 due</td>
</tr>
<tr>
<td>9</td>
<td>Oct 16</td>
<td>Hydrostatics</td>
<td></td>
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<tr>
<td></td>
<td>Oct 18</td>
<td>Hydrostatics</td>
<td>Problem-Set 2 due</td>
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<tr>
<td>10</td>
<td>Oct 23</td>
<td>Feeding</td>
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<tr>
<td></td>
<td>Oct 25</td>
<td>Exam 2</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Oct 30</td>
<td>Feeding</td>
<td>Post-Lab 4 due</td>
</tr>
<tr>
<td></td>
<td>Nov 1</td>
<td>Feeding</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Nov 6</td>
<td>Biomaterials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 8</td>
<td>Biomaterials</td>
<td>Problem-Set 3 due</td>
</tr>
<tr>
<td>13</td>
<td>Nov 13</td>
<td>Biomaterials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 15</td>
<td>Viscoelasticity</td>
<td>Lab Report 3 due</td>
</tr>
<tr>
<td>14</td>
<td>Nov 20</td>
<td>Structures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nov 22</td>
<td>NO LECTURE</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Nov 27</td>
<td>Structures</td>
<td>Post-Lab 5 due</td>
</tr>
<tr>
<td></td>
<td>Nov 29</td>
<td>Exam 3</td>
<td></td>
</tr>
</tbody>
</table>

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### Lab Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Location</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 23</td>
<td><strong>Introduction, MATLAB, 2D HSV</strong></td>
<td>Computer Lab</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Aug 30</td>
<td>Filter feeding</td>
<td>Clark Lab</td>
<td>Post-Lab 1 assigned</td>
</tr>
<tr>
<td>3</td>
<td>Sep 6</td>
<td>Filter feeding</td>
<td>Clark Lab</td>
<td>Lab Report 1 assigned</td>
</tr>
<tr>
<td>4</td>
<td>Sep 13</td>
<td><strong>Terrestrial locomotion</strong></td>
<td>Field Site</td>
<td>Post-Lab 2 assigned</td>
</tr>
<tr>
<td>5</td>
<td>Sep 20</td>
<td><strong>Terrestrial locomotion</strong></td>
<td>Field Site</td>
<td>Lab Report 2 assigned</td>
</tr>
<tr>
<td>6</td>
<td>Sep 27</td>
<td>Aquatic locomotion</td>
<td>Grice Marine Lab</td>
<td>Post-Lab 3 assigned</td>
</tr>
<tr>
<td>7</td>
<td>Oct 4</td>
<td>Aquatic locomotion</td>
<td>Grice Marine Lab</td>
<td>Lab Report 3 assigned</td>
</tr>
<tr>
<td>8</td>
<td>Oct 11</td>
<td><strong>3D HSV and Aerial locomotion</strong></td>
<td>Vance Lab</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oct 18</td>
<td>Aerial locomotion</td>
<td>Vance Lab</td>
<td>Post-Lab 4 assigned</td>
</tr>
<tr>
<td>10</td>
<td>Oct 25</td>
<td>Aerial locomotion</td>
<td>Vance Lab</td>
<td>Lab Report 3 assigned</td>
</tr>
<tr>
<td>11</td>
<td>Nov 1</td>
<td>Biomaterials</td>
<td>Clark Lab</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Nov 8</td>
<td>Biomaterials</td>
<td>Clark Lab</td>
<td>Post-Lab 5 assigned</td>
</tr>
<tr>
<td>13</td>
<td>Nov 15</td>
<td>Biomaterials</td>
<td>Clark Lab</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Nov 22</td>
<td><strong>NO LAB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Nov 29</td>
<td>Oral presentations</td>
<td>Lecture room</td>
<td></td>
</tr>
</tbody>
</table>

**Other:** Any changes, major announcements, etc. will be available on the syllabus posted on OAKS and/or will be sent to you via email. Therefore, it is important to check your email and sign into OAKS on a regular basis.

**PLEASE KEEP YOUR CELL PHONES, LAPTOPS, AND TABLETS OFF DURING LECTURE!**
February 17, 2014

To whom it may concern:

I write this letter to convey that the Biology Department fully supports the proposed new course, BIOL 356 Comparative Biomechanics.

Sincerely,

[Signature]

Jaap Hillenius
Chair, Department of Biology
Mike,

thank you for the endorsement!

Jason Vance
Assistant Professor
College of Charleston
Dept. of Biology
58 Coming Street - Room 321
Charleston, SC 29401
(843)953-4880

From: Flynn, Michael G
Sent: Tuesday, February 18, 2014 11:21 AM
To: Vance, Jason T
Subject: RE: Comparative Biomechanics: New Course Proposal

Jason:

Please let this email message serve as the endorsement of HEHP for your comparative biomechanics course. I sent your proposal to Bill Barfield and Miriam Klous. Dr. Barfield coordinates our exercise science program and teaches Kinesiology and Biomechanics. Dr. Klous who teaches Biomechanics in our department. Both responded that they did not see significant overlap between the course you propose and what we teach in our EXSC 440 Biomechanics class. Good luck moving your proposal forward. Please let me know if you need more information.

Mike

From: Vance, Jason T
Sent: Monday, February 17, 2014 4:45 PM
To: Flynn, Michael G
Subject: Comparative Biomechanics: New Course Proposal

Mike,

here is our course proposal for Comparative Biomechanics (BIOL 356). If your faculty have no comments or objections, please send a brief letter of approval stating there is no conflict or overlap in the course content. Thank you!

Jason Vance
Assistant Professor
College of Charleston
Dept. of Biology
58 Coming Street - Room 321
Charleston, SC 29401
(843)953-4880
FACULTY CURRICULUM COMMITTEE
CHANGE/DELETE PROGRAM FORM

Instructions:
- Please fill out all of the portions of the form that are specified in section B. You must do this before your request can move forward!
- Remember that your changes will not be implemented until the next catalog year at the earliest.
- If you have questions, please start by checking the detailed instructions on the website.
- Please feel free to contact the committee chair with any remaining questions you might have.

A. CONTACT INFORMATION.

Name: Andrew Clark  
Phone: 843-953-4879  
Email: clarkaj@cofc.edu

School: Science and Mathematics  
Department or Program: Biology (B.S.)

Name and Acronym of Major: Biology BIOL

B. CATEGORY OF REVIEW. Please check all that apply, then fill out the specified parts of the form.

☑ Change Request (fill out all sections)
  - Add an existing course to requirements or electives
  - Add a new course to requirements or electives (attach completed course form for each)
  - Delete courses from requirements or electives
  - Add or modify concentration*
  - Add or modify cognate*

*Note: Only concentrations and cognates requiring 18 or more credit hours will be tracked in Banner and Degree Works and noted on the transcript.

☐ Terminate Program (fill out E, G, H, and I)
  - Terminate degree
  - Terminate major
  - Terminate concentration
  - Terminate cognate

C. GENERAL INFORMATION

Number of Current Credit Hours (for existing program): 65+
Number of Proposed Credit Hours (for changed program): 65+
Catalog Year in which changes will take effect: FALL 2014

D. CURRICULUM. Please list every change you are making below AND attach the current Program of Study Worksheet for this major (http://registrar.cofc.edu/program-of-study-worksheets/index.php) with changes marked in RED. Additions should show where the course will be inserted, deletions should be noted by crossing out the course, and moves indicated with arrows. Distinguish between required and elective courses, and note any prerequisites, corequisites, sequencing, or other restrictions. Provide the catalog description and course list exactly as they should appear in the catalog. For each new course, submit the Curriculum Committee’s Course Form and a sample syllabus.

This form was last updated on 6/6/2013 and replaces all others.
E. RATIONALE AND EXPLANATION. This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Major electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic, terrestrial- and aerial- locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students know and be able to do when they complete the major or program?</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
<tr>
<td>1. At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see page 2) over the incoming first year class performance.</td>
</tr>
<tr>
<td>2. At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by steady performance overall on the Biology MFT compared to performance at the end of the foundation sequence.</td>
</tr>
<tr>
<td>3. At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.</td>
<td>Success is demonstrated by improved group performance for some of the Assessment Indicators (see page 3) on the Biology MFT compared to the end of the foundation sequence.</td>
</tr>
</tbody>
</table>
4. At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

Additional Outcomes or Comments:

G. IMPACT ON EXISTING PROGRAMS AND COURSES. Please describe the impact of this request on other programs and courses. If you are deleting a program, please describe the effect on all programs that will be impacted; if you are adding or changing a program, please explain any overlap with existing programs at the College.

Biology:
As a result of this change, students in this program will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students' progression through their respective degree programs should be enhanced by this experience.

Other Departments: Exercise Science
EXSC 330 Kinesiology and EXSC 440 Biomechanics: Like BIOL 356, both courses apply basic Newtonian physics to biological systems. However, EXSC 330 and 440 focus on motion analysis and biomechanics of human movement, respectively, whereas BIOL 356 focuses on the biomechanics of a broad range of organisms, including unicellular organisms, plants, invertebrates, and vertebrates, as well as a broad range of biomechanical phenomena, including feeding, aquatic, terrestrial, and aerial locomotion, and material properties. EXSC 330 and 440 do not have an associated laboratory component whereas BIOL 356 includes a laboratory component where students will gain experience using state-of-the-art research tools, techniques, and analyses. It is important to note that BIOL 356 is not a course requirement for any of the Exercise Science programs, and, neither EXSC 330 nor 440 are requirements or prerequisites for BIOL 356.
H. COSTS ASSOCIATED WITH THE REQUESTED ACTION. List all of the new costs or cost savings (including new faculty/staff requests, library, or equipment) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CofC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members’ research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

I. CHECKLIST

☒ I have completed all relevant parts of the form.

☒ I have attached a cover letter that describes my request and lists all the documents I am submitting.

☒ I have attached a Course Form for each newly-created or modified course.

☐ N/A (For proposals that affect other departments in any way) I have attached an acknowledgement from the relevant department.

☒ I have provided the complete curriculum for the program, concentration, emphasis, etc., including the description and course list, exactly as it should appear in the catalog.

☒ I have submitted one Signature Form that lists all of the different forms I am submitting.
Biology Major Requirements
Catalog Year: 2013-14
Degree: Bachelor of Science
Credit Hours: 65+

*"PR" indicates a pre-requisite. *"CO" indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult http://registrar.cofc.edu/general-edu for more information.

Required Courses

☐ BIOL 111 Introduction to Cell and Molecular Biology (3) PR: None; CO: BIOL 111L
☐ BIOL 111L Introduction to Cell and Molecular Biology Lab (1) CO: BIOL 111

OR
☐ HONS 151 Honors Biology I (3) PR: None; CO: HONS 151L
☐ HONS 151L Honors Biology I Lab (1) CO: HONS 151

☐ BIOL 112 Evolution, Form, and Function of Organisms (3) PR: BIOL 111 and 111L; CO: BIOL 112L
☐ BIOL 112L Evolution, Form, and Function of Organisms Lab (1) CO: BIOL 112L

OR
☐ HONS 152 Honors Biology II (3) PR: HONS 151 and 151L; CO: HONS 152L
☐ HONS 152L Honors Biology II Lab (1) CO: HONS 152

☐ BIOL 211 Biodiversity, Ecology, and Conservation Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; CO: BIOL 211D
☐ BIOL 211D Biodiversity, Ecology, and Conservation Biology Discussion (0) CO: BIOL 211

☐ BIOL 305 Genetics (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D and MATH 250 or instructor permission

☐ Complete 19 credit hours of 300-level or above BIOL courses including at least four courses with labs from the BIOLOGY 300-LEVEL AND ABOVE ELECTIVES LIST. Note: Independent study, tutorial, Bachelor's Essay, or BIOL 450 and 451 with labs do not fulfill the lab requirement.

BIOLOGY 300-LEVEL AND ABOVE ELECTIVES LIST

BIOL 300 Botany (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 301 Plant Taxonomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 302 Plant Anatomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 303 Phycology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 304 Plant Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 305L Genetics Lab (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D, BIOL 305 and MATH 250

BIOL 310 General Microbiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 312 Molecular Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250

BIOL 312L Molecular Biology Laboratory (1) PR or CO: BIOL 312 and MATH 250. Students cannot use both BIOL 412 and BIOL 312L towards their major requirements.
BIOL 313  Cell Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 313L  Cell Biology Laboratory (1) PR or CO: BIOL 313 and MATH 250

BIOL 314  Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and one year of Chemistry; PR or CO: MATH 250

BIOL 320  Histology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 321  General and Comparative Physiology PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250 or equivalent course in statistics or instructor permission

BIOL 322  Developmental Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 323  Comparative Anatomy of Vertebrates (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 332  Vertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 333  Ornithology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 334  Herpetology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 335  Biology of Fishes (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 336  Parasitology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 337  Invertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 338  Entomology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 339  Dinosaur Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 340  Zoogeography (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 341  General Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 342  Oceanography (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250; one year of college-level Math and one year of college-level Chemistry

BIOL 343  Animal Behavior (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 350  Evolution (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 351  Principles of Neurobiology (3) PR: PSYC 103 and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D or PSYC 214; PR or CO: MATH 250
BIOL 352  Neurobiology and Behavior (3) PR: BIOL 351 or PSYC 351 or PSYC 214; PR or CO: MATH 250

BIOL 353  Hormones and Behavior (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 354  Techniques in Neuroscience (4) PR: BIOL 351 or PSYC 351; MATH 250 or PSYC 211 and PSYC 220 or PSYC 250; and instructor permission

BIOL 356  Comparative Biomechanics (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 162 and 162L, and BIOL 211; PR or CO: BIOL 305, MATH 250 and PHYS 101 or 111; or instructor permission.

BIOL 357  Oceanographic Research (4) PR: BIOL 342 and instructor permission; PR or CO: MATH 250

BIOL 360  Introduction to Biometry (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 396  Biophysical Modeling of Excitable Cells (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and PHYS 111 and 111L and PHYS 112 and 112 L or HONS 158 and 158L or BIOL 211 and 211D and BIOL 305 and PHYS 101 and 101L and PHYS 102 and 102L; PR or CO: MATH 250

BIOL 399  Tutorial (1-3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; junior standing and tutor and department chair permission; PR or CO: MATH 250

BIOL 406  Conservation Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and BIOL 341 or permission of instructor; PR or CO: MATH 250

BIOL 410  Applied and Environmental Microbiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; BIOL 310 and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 411  Microtechnique and Cytochemistry (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 412  Capstone in Molecular Biology (3) PR: BIOL 111/111L or HONS 151/151L, BIOL 112/112L or HONS 152/152L, BIOL 211/211D, BIOL 305, BIOL 312, MATH 111 PR or CO: CHEM 351, MATH 250. Students cannot use both BIOL 412 and BIOL 312L towards their major requirements.

BIOL 414  Environmental Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and BIOL 312 or BIOL 313 or CHEM 351 and MATH 250

BIOL 420  General and Comparative Endocrinology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of endocrinology; PR or CO: BIOL 305 and MATH 250 and a course in physiology or instructor permission

BIOL 421  Topics in Physiology, Cell, and Molecular Biology of Marine Organisms (3) PR: BIOL 312 or 313; BIOL 321 and instructor permission; PR or CO: MATH 250

BIOL 444  Plant Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 341 or instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 445  Systematic Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; junior standing and at least one upper division course in organismal Biology; PR or CO: MATH 250

BIOL 446  Special Topics in Neuroscience (3) PR: Junior or senior standing and instructor permission; PR or CO: MATH 250

BIOL 447  Seminar in Neuroscience (3) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352; CO: BIOL 448 or PSYC 448; PR or CO: MATH 250

BIOL 448  Bachelor's Essay in Neuroscience (6) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352 and permission of student's major department and the neuroscience program director; PR or CO: MATH 250

BIOL 449  Biology of Coral Reefs (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341; 3.00 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 450  Problems in Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250
Problems in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

Seminar (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; 2.50 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed; PR or CO: BIOL 305 and MATH 250

Special Topics (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and instructor permission; PR or CO: BIOL 305 and MATH 250

Seminar in Molecular Biology (2) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305, 312 and 313; PR or CO: MATH 250

Bachelor's Essay (6) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; instructor and department chair permission; PR or CO: MATH 250

Biography of the Crustacea (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 337; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

Special Topics in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

Special Topics in Ecology (3-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

Chemistry Requirement

- CHEM 111 Principles of Chemistry (3) PR or CO: unless students exempt MATH 111 via diagnostic testing or have completed this course as a prerequisite, they are required to take MATH 111 as a co-requisite; CO: CHEM 111
- CHEM 111L Principles of Chemistry Lab (1) CO: CHEM 111
- CHEM 112 Principles of Chemistry (3) PR: CHEM 111 and 111L or HONS 153 and 153L; CO: CHEM 112L (MATH 120 strongly recommended)
- CHEM 112L Principles of Chemistry Lab (1) CO: CHEM 112
- CHEM 231 Organic Chemistry (3) PR: CHEM 112 and CHEM 112L or HONS 154 and HONS 154L; CO: CHEM 231L
- CHEM 231L Introduction to Organic Chemistry Laboratory Techniques (1) CO: CHEM 231
- CHEM 232 Organic Chemistry (3) PR: CHEM 231 and CHEM 231L; CO: CHEM 232L
- CHEM 232L Organic Synthesis and Analysis (1) CO: CHEM 232

Physics Requirement

- PHYS 101 Introductory Physics (3) PR: None; CO or PR: PHYS 101L
- PHYS 101L Introductory Physics Lab (1) CO: PHYS 101
AND
- PHYS 102 Introductory Physics II (3) PR: PHYS 101 or PHYS 111 or HONS 157; CO: PHYS 102L
- PHYS 102L Introductory Physics Lab (1) CO: PHYS 102
OR

- PHYS 111 General Physics I (3) PR or CO: MATH 120 or equivalent or instructor permission; CO: PHYS 111L
- PHYS 111L General Physics I Lab (1) CO: PHYS 111
AND
- PHYS 112 General Physics II (3) PR: PHYS 111 or HONS 157; CO or PR: MATH 220 or equivalent or instructor permission; CO: PHYS 112L
- PHYS 112L General Physics II Lab (1) CO: PHYS 112
Mathematics Requirement

☐ MATH 120 Introductory Calculus (4) PR: Placement or C- or better in MATH 111

☐ MATH 250 Statistical Methods I (3) PR: Either MATH 111, 120 or instructor permission

Notes:

- MATH 250 is a prerequisite for all 300-level BIOL courses.

- CHEM 221 is a recommended course.

- Honors students can take the alternative sequence of HONS191/HONS191L, HONS 192/HONS192L, HONS293/HONS293L, and HONS294/HONS294L in lieu of CHEM 111/111L, CHEM 112/112L, CHEM 231/231L, and CHEM 232/ CHEM 232L

- Honors students can take the alternative sequence of HONS 157/HONS 157L and HONS 158/HCNS 158L in lieu of PHYS 111/111L and PHYS 112/112L
FACULTY CURRICULUM COMMITTEE
CHANGE/Delete PROGRAM FORM

Instructions:
• Please fill out all of the portions of the form that are specified in section B. You must do this before your request can move forward!
• Remember that your changes will not be implemented until the next catalog year at the earliest.
• If you have questions, please start by checking the detailed instructions on the website.
• Please feel free to contact the committee chair with any remaining questions you might have.

A. CONTACT INFORMATION.

Name: Andrew Clark Phone: 843-953-4879 Email: clarkaj@cofc.edu
School: Science and Mathematics Department or Program: Marine Biology (B.S.)
Name and Acronym of Major: Biology (BIOL)

B. CATEGORY OF REVIEW. Please check all that apply, then fill out the specified parts of the form.

✓ Change Request (fill out all sections)
  □ Add an existing course to requirements or electives
  ✓ Add a new course to requirements or electives (attach completed course form for each)
  □ Delete courses from requirements or electives
  □ Add or modify concentration*
  □ Add or modify cognate*

*Note: Only concentrations and cognates requiring 18 or more credit hours will be tracked in Banner and Degree Works and noted on the transcript.

□ Terminate Program (fill out E, G, H, and I)
  □ Terminate degree
  □ Terminate major
  □ Terminate concentration
  □ Terminate cognate

C. GENERAL INFORMATION

Number of Current Credit Hours (for existing program): 65+
Number of Proposed Credit Hours (for changed program): 65+
Catalog Year in which changes will take effect: FALL 2014

D. CURRICULUM. Please list every change you are making below AND attach the current Program of Study Worksheet for this major (http://Registrar.cofc.edu/Program-of-Study-Worksheets/index.php) with changes marked in RED. Additions should show where the course will be inserted, deletions should be noted by crossing out the course, and moves indicated with arrows. Distinguish between required and elective courses, and note any prerequisites, co-requisites, sequencing, or other restrictions. Provide the catalog description and course list exactly as they should appear in the catalog. For each new course, submit the Curriculum Committee’s Course Form and a sample syllabus.

This form was last updated on 6/6/2013 and replaces all others.
E. RATIONALE AND EXPLANATION. This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Major electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic, terrestrial- and aerial-locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students know and be able to do when they complete the major or program?</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
<tr>
<td>1. At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see page 2) over the incoming first year class performance.</td>
</tr>
<tr>
<td>2. At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by steady performance overall on the Biology MFT compared to performance at the end of the foundation sequence.</td>
</tr>
<tr>
<td>3. At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.</td>
<td>Success is demonstrated by improved group performance for some of the Assessment Indicators (see page 3) on the Biology MFT compared to the end of the foundation sequence.</td>
</tr>
</tbody>
</table>

This form was last updated on 6/6/2013 and replaces all others.
<table>
<thead>
<tr>
<th>4. At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.</td>
</tr>
</tbody>
</table>

**Additional Outcomes or Comments:**

---

**G. IMPACT ON EXISTING PROGRAMS AND COURSES.** Please describe the impact of this request on other programs and courses. If you are deleting a program, please describe the effect on all programs that will be impacted; if you are adding or changing a program, please explain any overlap with existing programs at the College.

**Biology:**
As a result of this change, students in this program will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students' progression through their respective degree programs should be enhanced by this experience.

**Other Departments: Exercise Science**
EXSC 330 Kinesiology and EXSC 440 Biomechanics: Like BIOL 356, both courses apply basic Newtonian physics to biological systems. However, EXSC 330 and 440 focus on motion analysis and biomechanics of human movement, respectively, whereas BIOL 356 focuses on the biomechanics of a broad range of organisms, including unicellular organisms, plants, invertebrates, and vertebrates, as well as a broad range of biomechanical phenomena, including feeding, aquatic, terrestrial, and aerial locomotion, and material properties. EXSC 330 and 440 do not have an associated laboratory component whereas BIOL 356 includes a laboratory component where students will gain experience using state-of-the-art research tools, techniques, and analyses. It is important to note that BIOL 356 is not a course requirement for any of the Exercise Science programs, and, neither EXSC 330 nor 440 are requirements or prerequisites for BIOL 356.
H. COSTS ASSOCIATED WITH THE REQUESTED ACTION. List all of the new costs or cost savings (including new faculty/staff requests, library, or equipment) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CofC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members' research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

I. CHECKLIST

☒ I have completed all relevant parts of the form.

☒ I have attached a cover letter that describes my request and lists all the documents I am submitting.

☒ I have attached a Course Form for each newly-created or modified course.

☐ N/A (For proposals that affect other departments in any way) I have attached an acknowledgement from the relevant department.

☒ I have provided the complete curriculum for the program, concentration, emphasis, etc., including the description and course list, exactly as it should appear in the catalog.

☒ I have submitted one Signature Form that lists all of the different forms I am submitting.
Marine Biology Major Requirements
Catalog Year: 2013-14
Degree: Bachelor of Science
Credit Hours: 64+

"PR" indicates a pre-requisite. "CO" indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult http://registrar.cofc.edu/general-edu for more information.

Required Courses

☐ BIOL 111 Introduction to Cell and Molecular Biology (3) PR: None; CO: BIOL 111L
☐ BIOL 111L Introduction to Cell and Molecular Biology Lab (1) CO: BIOL 111

OR

☐ HONS 151 Honors Biology I (3) PR: None; CO: HONS 151L
☐ HONS 151L Honors Biology I Lab (1) CO: HONS 151

☐ BIOL 112 Evolution, Form, and Function of Organisms (3) PR: BIOL 111 and 111L; CO: BIOL 112L
☐ BIOL 112L Evolution, Form, and Function of Organisms Lab (1) CO: BIOL 112L

OR

☐ HONS 152 Honors Biology II (3) PR: HONS 151 and 151L; CO: HONS 152L
☐ HONS 152L Honors Biology II Lab (1) CO: HONS 152

☐ BIOL 211 Biodiversity, Ecology, and Conservation Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; CO: BIOL 211D
☐ BIOL 211D Biodiversity, Ecology, and Conservation Biology Discussion (0) CO: BIOL 211

☐ BIOL 305 Genetics (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D and MATH 250 or instructor permission

☐ BIOL 335 Biology of Fishes (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

☐ BIOL 337 Invertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

☐ BIOL 341 General Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

☐ BIOL 342 Oceanography (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250; one year of college-level Math and one year of college-level Chemistry

Complete 3 credit hours of 300-level or above Biology courses from the BIOLOGY 300-LEVEL AND ABOVE ELECTIVES LIST.

☐ ______________

BIOLOGY 300-LEVEL AND ABOVE ELECTIVES LIST

BIOL 300 Botany (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 301 Plant Taxonomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 302 Plant Anatomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 303 Phycology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
BIOL 304  Plant Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 305L  Genetics Lab (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D, BIOL 305 and MATH 250

BIOL 310  General Microbiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 312  Molecular Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250

BIOL 312L  Molecular Biology Laboratory (1) PR or CO: BIOL 312 and MATH 250. Students cannot use both BIOL 412 and BIOL 312L towards their major requirements.

BIOL 313  Cell Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 313L  Cell Biology Laboratory (1) PR or CO: BIOL 313 and MATH 250

BIOL 314  Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and one year of Chemistry; PR or CO: MATH 250

BIOL 320  Histology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 321  General and Comparative Physiology PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250 or equivalent course in statistics or instructor permission

BIOL 322  Developmental Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 323  Comparative Anatomy of Vertebrates (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 332  Vertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 333  Ornithology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 334  Herpetology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 336  Parasitology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 338  Entomology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 339  Dinosaur Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 340  Zoogeography (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 343  Animal Behavior (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 350  Evolution (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250
BIOL 351 Principles of Neurobiology (3) PR: PSYC 103 and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D or PSYC 214; PR or CO: MATH 250

BIOL 352 Neurobiology and Behavior (3) PR: BIOL 351 or PSYC 351 or PSYC 214; PR or CO: MATH 250

BIOL 353 Hormones and Behavior (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 354 Techniques in Neuroscience (4) PR: BIOL 351 or PSYC 351; MATH 250 or PSYC 211 and PSYC 220 or PSYC 250; and instructor permission

BIOL 356 Comparative Biomechanics (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L, and BIOL 211; PR or CO: BIOL 305, MATH 250 and PHYS 101 or 111; or instructor permission.

BIOL 357 Oceanographic Research (4) PR: BIOL 342 and instructor permission; PR or CO: MATH 250

BIOL 360 Introduction to Biometry (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 396 Biophysical Modeling of Excitable Cells (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and PHYS 111 and 111L and PHYS 112 and 112L or HONS 158 and 158L or BIOL 211 and 211D and BIOL 305 and PHYS 101 and 101L and PHYS 102 and 102L; PR or CO: MATH 250

BIOL 399 Tutorial (1-3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; junior standing and tutor and department chair permission; PR or CO: MATH 250

BIOL 406 Conservation Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 or permission of instructor; PR or CO: MATH 250

BIOL 410 Applied and Environmental Microbiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; BIOL 310 and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 411 Microbiology and Cytochemistry (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; BIOL 305 and one year of Chemistry; PR or CO: MATH 305 and MATH 250

BIOL 412 Capstone in Molecular Biology (3) PR: BIOL 111/111L or HONS 151/151LBIOL 112/112L or HONS 152/152LBIOL 211/211D, BIOL 305, BIOL 312, MATH 111 PR or CO: CHEM 351, MATH 250. Students cannot use both BIOL 412 and BIOL 312 towards their major requirements.

BIOL 414 Environmental Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and BIOL 312 or BIOL 313 and CHEM 351 and MATH 250

BIOL 420 General and Comparative Endocrinology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250 and a course in physiology or instructor permission

BIOL 421 Topics in Physiology, Cell, and Molecular Biology of Marine Organisms (3) PR: BIOL 312 or 313; BIOL 321 and instructor permission; PR or CO: MATH 250

BIOL 444 Plant Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 341 or instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 445 Systematic Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; junior standing and at least one upper division course in organismal Biology; PR or CO: MATH 250

BIOL 446 Special Topics in Neuroscience (3) PR: Junior or senior standing and instructor permission; PR or CO: MATH 250

BIOL 447 Seminar in Neuroscience (3) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352; CO: BIOL 44B or PSYC 44B; PR or CO: MATH 250

BIOL 448 Bachelor's Essay in Neuroscience (6) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352 and permission of student's major department and the neuroscience program director; PR or CO: MATH 250

BIOL 449 Biology of Coral Reefs (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341, 3.00 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250
BIOL 450  Problems in Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

BIOL 451  Problems in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

BIOL 452  Seminar (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; 2.50 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed; PR or CO: BIOL 305 and MATH 250

BIOL 453  Special Topics (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 455  Seminar in Molecular Biology (2) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305, 312 and 313; PR or CO: MATH 250

BIOL 499  Bachelor's Essay (6) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; instructor and department chair permission; PR or CO: MATH 250

BIOL 501  Biology of the Crustacea (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 337; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 502  Special Topics in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 503  Special Topics in Ecology (3-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

Chemistry Requirement

☐ CHEM 111  Principles of Chemistry (3) PR or CO: unless students exempt MATH 111 (via diagnostic testing) or have completed this course as a pre-requisite, they are required to take MATH 111 as a co-requisite; CO: CHEM 111L

☐ CHEM 111L  Principles of Chemistry Lab (1) CO: CHEM 111

AND

☐ CHEM 112  Principles of Chemistry (3) PR: CHEM 111 and 111L or HONS 153 and 153L; CO: CHEM 112L (MATH 120 strongly recommended)

☐ CHEM 112L  Principles of Chemistry Lab (1) CO: CHEM 112

AND

☐ CHEM 221  Quantitative Analysis (4) PR: CHEM 112 and CHEM 112L or HONS 154 and HONS 154L; CO: CHEM 221L

OR

☐ CHEM 231  Organic Chemistry (3) PR: CHEM 112 and CHEM 112L or HONS 154 and HONS 154L; CO: CHEM 231L

☐ CHEM 231L  Introduction to Organic Chemistry Laboratory Techniques (1) CO: CHEM 231

AND

☐ CHEM 232  Organic Chemistry (3) PR: CHEM 231 and CHEM 231L; CO: CHEM 232L

☐ CHEM 232L  Organic Synthesis and Analysis (1) CO: CHEM 232

Physics Requirement

☐ PHYS 101  Introductory Physics (3) PR: None; CO or PR: PHYS 101L

☐ PHYS 101L  Introductory Physics Lab (1) CO: PHYS 101

AND

☐ PHYS 102  Introductory Physics II (3) PR: PHYS 101 or PHYS 111 or HONS 157; CO: PHYS 102L

☐ PHYS 102L  Introductory Physics Lab (1) CO: PHYS 102

OR
□ PHYS 111 General Physics I (3) PR or CO: MATH 120 or equivalent or instructor permission; CO: PHYS 111L
□ PHYS 111L General Physics I Lab (1) CO: PHYS 111
AND
□ PHYS 112 General Physics II (3) PR: PHYS 111 or HONS 157; CO or PR: MATH 220 or equivalent or instructor permission; CO: PHYS 112L
□ PHYS 112L General Physics II Lab (1) CO: PHYS 112

Mathematics Requirement
□ MATH 120 Introductory Calculus (4) PR: Placement or C- or better in MATH 111
□ MATH 250 Statistical Methods I (3) PR: Either MATH 111, 120 or instructor permission

Complete one of the following Geology courses:
□

GEOL 101 Dynamic Earth (3) PR: None; CO: GEOL 101L
GEOL 101L Dynamic Earth Lab (1) CO: GEOL 101

GEOL 103 Environmental Geology (3) PR: None; CO: GEOL 103L
GEOL 103L Environmental Geology Lab (1) CO: GEOL 103

GEOL 107* Introduction to Coastal and Marine Geology (3) PR: None.

Note: *This course may not be used to fulfill natural science general education or Geology major requirements. Students may not receive credit for both GEOL 107 and 257. This course is recommended for Marine Biology majors.

Notes:

- MATH 250 is a prerequisite for all 300-level BIOL courses.

- CHEM 221 is a recommended course.

- Honors students can take the alternative sequence of HONS191/HONS191L, HONS 192/HONS192L, HONS293/HONS293L, and HONS294/HONS294L in lieu of CHEM 111/111L, CHEM 112/112L, CHEM 231/231L, and CHEM 232/CHEM 232L

- Honors students can take the alternative sequence of HONS157/HONS157L and HONS 158/HONS158L in lieu of PHYS 111/111L and PHYS112/112L
FACULTY CURRICULUM COMMITTEE
MINOR FORM

Instructions:
- Please fill out all of the portions of the form that are specified in section B. You must do this before your request can move forward!
- Remember that your changes will not be implemented until the next catalog year at the earliest.
- If you have questions, please start by checking the detailed instructions on the website. Please feel free to contact the committee chair with any remaining questions you might have.

A. CONTACT INFORMATION.

Name: Andrew Clark
Phone: 843-953-4879
Email: clarkaj@cofc.edu

School: Science and Mathematics
Department or Program: Biology

Name and Acronym of Minor: Biology Minor (BIOL)

B. TYPE OF REQUEST. Please check all that apply, then fill out the specified parts of the form.

☐ Add a New Minor (complete all portions)

☒ Change an Existing Minor (complete C, D, E, G, H, and I)
  ☐ Add existing course or courses to requirements or electives
  ☒ Add new course(s) to requirements or electives (attach completed course form for each)
  ☐ Delete courses from requirements or electives

☐ Terminate a Minor (complete E, G, H, and I)

C. GENERAL INFORMATION.

Number of Current Credit Hours (for existing minors): 65+
Number of Proposed Credit Hours (for new or changing minors): 65+

Catalog year in which changes will take effect: FALL 2014

☐ Interdisciplinary (please see guidelines on the Curriculum Committee website and include acknowledgments from relevant departments)

According to academic policy, students may not obtain a major/concentration and minor in the same subject. Will students in specific majors be prohibited from declaring this minor because of this policy?

☐ Yes—Which major(s) or concentration(s)?

☐ No

D. CURRICULUM. For a changed minor, please list every change you are making below AND attach the current catalog entry for this minor (from the Minor Requirements section) with changes marked in RED. Additions should show where the course will be inserted, deletions should be noted by crossing out the course, and moves indicated with arrows. Distinguish between required and elective courses, and note any prerequisites, co-requisites, sequencing, or other restrictions. For each new course, submit the Curriculum Committee's Course Form and a sample syllabus. For a new program, please submit the complete curriculum and catalog description exactly as they should appear in the catalog.

This form was last updated on 6/6/2013 and replaces all others.
E. RATIONALE AND EXPLANATION. Please provide a narrative addressing the request you are making and why you are making it. In addition, for a new minor, please address its objectives, provide evidence of student interest (e.g. interviews with student focus groups, enrollment in special-topics courses in this area), and explain how the minor supports the liberal arts tradition as well as the mission of the institution.

This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Minor electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic, terrestrial- and aerial-locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
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<td>What will students know and be able to do when they complete the minor? Attach a Curriculum Map.</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
</tbody>
</table>

1.

2.

3.

4.

How does this minor align with the student learning outcomes articulated for the major, program, or general education? What program-level outcome or outcomes does it support? Is the content or skill introduced, reinforced, or demonstrated in this minor?
G. IMPACT ON EXISTING PROGRAMS AND COURSES. Please describe the impact of this request on other programs and courses. If you are deleting a minor, please identify all programs that will be affected. If you are adding or changing a minor, please explain any overlap with existing programs at the College.

Biology:
As a result of this change, students in this program will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students’ progression through their respective degree programs should be enhanced by this experience.

Other Departments: Exercise Science
EXSC 330 Kinesiology and EXSC 440 Biomechanics: Like BIOL 356, both courses apply basic Newtonian physics to biological systems. However, EXSC 330 and 440 focus on motion analysis and biomechanics of human movement, respectively, whereas BIOL 356 focuses on the biomechanics of a broad range of organisms, including unicellular organisms, plants, invertebrates, and vertebrates, as well as a broad range of biomechanical phenomena, including feeding, aquatic, terrestrial, and aerial locomotion, and material properties. EXSC 330 and 440 do not have an associated laboratory component whereas BIOL 356 includes a laboratory component where students will gain experience using state-of-the-art research tools, techniques, and analyses. It is important to note that BIOL 356 is not a course requirement for any of the Exercise Science programs, and, neither EXSC 330 nor 440 are requirements or prerequisites for BIOL 356.

H. COSTS. List all of the new costs or cost savings (including new faculty/staff requests, library, equipment, etc.) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CoC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members’ research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

I. CHECKLIST.

☐ I have completed all relevant parts of the form.
☐ I have attached a cover letter that describes my request and lists all the documents I am submitting.
☐ I have attached a Course Form for each newly-created or modified course.
☐ N/A (For proposals that affect other departments in any way) I have attached an acknowledgement from the relevant department.
☐ N/A I have provided the complete curriculum for the minor, including the description and course list, exactly as it should appear in the catalog.
☐ I have submitted one Signature Form that lists all of the different forms I am submitting.
ASTR 377  Experimental Astronomy
ASTR 410  Black Holes: Advanced Topics
ASTR 413  Astrophysics
GEOL 206  Planetary Geology
PHYS 101  Introductory Physics
PHYS 102  Introductory Physics
PHYS 111/L  General Physics I (with laboratory)
PHYS 111/111L  General Physics II (with laboratory)
PHYS 298  Special Topics* (astronomy related topic)
PHYS 301  Classical Mechanics
PHYS 340  Photonics
PHYS 390  Research*
PHYS 399  Tutorial*
PHYS 412  Special Topics*
PHYS 420  Senior Research*
PHYS 499  Bachelor's Essay*

*Must involve astronomy and must be approved by the astronomy minor program director.
If not used as a core course.

NOTES:
1. A maximum of three courses may be at the 100 level.
2. Students may not receive credit for both PHYS 101 and 111, for both PHYS 102 and 112, or for both ASTR 129/130 and Honors Astronomy.
3. Students must notify the astronomy minor program director prior to graduation to receive credit for the minor on their transcript.

Biology Minor

Credit Hours: 23

Minor Requirements:
At least nine (9) hours in the minor at the 200 level or above must be earned at the College of Charleston.

BIOL 111/111L  Introduction to Cell and Molecular Biology (with laboratory)
BIOL 112/112L  Evolution, Form, and Function of Organisms (with laboratory)
BIOL 211D  Biodiversity, Ecology, and Conservation
BIOL 305  Genetics
MATH 250  Statistical Methods I (or equivalent course in statistics)

5 additional hours in biology, with at least three (3) hours at the 300 level or above.
BIOL 356 (Comparative Biomechanics) can be used as a 300+ level elective towards the Biology Minor.

See course listings for a complete list of courses offered.

Biomedical Physics Minor

Credit Hours: 18

Minor Requirements:
Students must take a minimum of 18 credit hours in physics and biology as listed below. At least 9 credit hours in the minor at the 200 level or above must be earned at the College of Charleston. A maximum of 3 credit hours of biology or chemistry courses at the 200-level and above may be counted toward the minor.

PHYS 102/102L  Introductory Physics II (with laboratory) or
PHYS 111/L  General Physics II (with laboratory) or
FACULTY CURRICULUM COMMITTEE
CHANGE/DELETE PROGRAM FORM

Instructions:

• Please fill out all of the portions of the form that are specified in section B. You must do this before your request can move forward!
• Remember that your changes will not be implemented until the next catalog year at the earliest.
• If you have questions, please start by checking the detailed instructions on the website.
• Please feel free to contact the committee chair with any remaining questions you might have.

A. CONTACT INFORMATION.

Name: Andrew Clark    Phone: 843-953-4879    Email: clarkaj@cofc.edu

School: Science and Mathematics    Department or Program: Biology (B.A.)

Name and Acronym of Major: Biology (BIOL)

B. CATEGORY OF REVIEW. Please check all that apply, then fill out the specified parts of the form.

☐ Change Request (fill out all sections)

☐ Add an existing course to requirements or electives
☐ Add a new course to requirements or electives (attach completed course form for each)
☐ Delete courses from requirements or electives
☐ Add or modify concentration*
☐ Add or modify cognate*

*Note: Only concentrations and cognates requiring 18 or more credit hours will be tracked in Banner and Degree Works and noted on the transcript.

☐ Terminate Program (fill out E, G, H, and I)

☐ Terminate degree
☐ Terminate major
☐ Terminate concentration
☐ Terminate cognate

C. GENERAL INFORMATION

Number of Current Credit Hours (for existing program): 65+
Number of Proposed Credit Hours (for changed program): 65+
Catalog Year in which changes will take effect: FALL 2014

D. CURRICULUM. Please list every change you are making below AND attach the current Program of Study Worksheet for this major (http://registrar.cofc.edu/program-of-study-worksheets/index.php) with changes marked in RED. Additions should show where the course will be inserted, deletions should be noted by crossing out the course, and moves indicated with arrows. Distinguish between required and elective courses, and note any prerequisites, co-requisites, sequencing, or other restrictions. Provide the catalog description and course list exactly as they should appear in the catalog. For each new course, submit the Curriculum Committee’s Course Form and a sample syllabus.

This form was last updated on 6/6/2013 and replaces all others.
E. RATIONALE AND EXPLANATION. This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Major electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic-, terrestrial- and aerial-locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

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1. At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology. | Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see page 2) over the incoming first year class performance. |

2. At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology. | Success is demonstrated by steady performance overall on the Biology MFT compared to performance at the end of the foundation sequence. |

3. At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence. | Success is demonstrated by improved group performance for some of the Assessment Indicators (see page 3) on the Biology MFT compared to the end of the foundation sequence. |

This form was last updated on 6/6/2013 and replaces all others.  Page 2 of 4
4. At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

G. IMPACT ON EXISTING PROGRAMS AND COURSES. Please describe the impact of this request on other programs and courses. If you are deleting a program, please describe the effect on all programs that will be impacted; if you are adding or changing a program, please explain any overlap with existing programs at the College.

Biology:
As a result of this change, students in this program will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students' progression through their respective degree programs should be enhanced by this experience.

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H. COSTS ASSOCIATED WITH THE REQUESTED ACTION. List all of the new costs or cost savings (including new faculty/staff requests, library, or equipment) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CofC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members' research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

I. CHECKLIST

☒ I have completed all relevant parts of the form.

☒ I have attached a cover letter that describes my request and lists all the documents I am submitting.

☒ I have attached a Course Form for each newly-created or modified course.

☐ N/A (For proposals that affect other departments in any way) I have attached an acknowledgement from the relevant department.

☒ I have provided the complete curriculum for the program, concentration, emphasis, etc., including the description and course list, exactly as it should appear in the catalog.

☒ I have submitted one Signature Form that lists all of the different forms I am submitting.
Biology Major Requirements  
Catalog Year: 2013-14  
Degree: Bachelor of Arts  
Credit Hours: 39+

*PR* indicates a pre-requisite. *CO* indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult [http://registrar.cofc.edu/general-edu](http://registrar.cofc.edu/general-edu) for more information.

Required Courses

- [ ] BIOL 111 Introduction to Cell and Molecular Biology (3) PR: None; CO: BIOL 111L
- [ ] BIOL 111L Introduction to Cell and Molecular Biology Lab (1) CO: BIOL 111

OR

- [ ] HONS 151 Honors Biology I (3) PR: None; CO: HONS 151L
- [ ] HONS 151L Honors Biology I Lab (1) CO: HONS 151

- [ ] BIOL 112 Evolution, Form, and Function of Organisms (3) PR: BIOL 111 and 111L; CO: BIOL 112L
- [ ] BIOL 112L Evolution, Form, and Function of Organisms Lab (1) CO: BIOL 112L

OR

- [ ] HONS 152 Honors Biology II (3) PR: HONS 151 and 151L; CO: HONS 152L
- [ ] HONS 152L Honors Biology II Lab (1) CO: HONS 152

- [ ] BIOL 211 Biodiversity, Ecology, and Conservation Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; CO: BIOL 211D
- [ ] BIOL 211D Biodiversity, Ecology, and Conservation Biology Discussion (0) CO: BIOL 211

- [ ] BIOL 305 Genetics (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D and MATH 250 or instructor permission

- Complete 13 credit hours of BIOL courses from the following, including 9 credit hours at the 300-level or above; three courses must be taken with labs; two of the courses with labs must be at the 300-level or above. Labs may carry separate credit or be part of a 4 credit course. (Independent study, tutorial, Bachelor's Essay, or BIOL 450 and 451 with labs do not fulfill the lab requirement).

  - BIOL 201 Human Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L
  - BIOL 202 Human Anatomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L
  - BIOL 204 Man and the Environment (3) PR: None
  - BIOL 209 Marine Biology (4) PR: None
  - BIOL 250 Special Topics in Biology (1-4) PR: One year of biology or instructor permission
  - BIOL 300 Botany (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
  - BIOL 301 Plant Taxonomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
  - BIOL 302 Plant Anatomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
  - BIOL 303 Phycology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
  - BIOL 304 Plant Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of chemistry; PR or CO: BIOL 305 and MATH 250
BIOL 305L Genetics Lab (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D, BIOL 305 and MATH 250

BIOL 310 General Microbiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 312 Molecular Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250

BIOL 312L Molecular Biology Laboratory (1) PR or CO: BIOL 312 and MATH 250. Students cannot use both BIOL 412 and BIOL 312L towards their major requirements.

BIOL 313 Cell Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 313L Cell Biology Laboratory (1) PR or CO: BIOL 313 and MATH 250

BIOL 314 Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and one year of Chemistry; PR or CO: MATH 250

BIOL 320 Histology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 321 General and Comparative Physiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250 or equivalent course in statistics or instructor permission

BIOL 322 Developmental Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 323 Comparative Anatomy of Vertebrates (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 332 Vertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 333 Ornithology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 334 Herpetology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 335 Biology of Fishes (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 336 Parasitology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 337 Invertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 338 Entomology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 339 Dinosaur Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 340 Zoogeography (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 341 General Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
BIOL 342 Oceanography (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250; one year of college-level Math and one year of college-level Chemistry

BIOL 343 Animal Behavior (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 350 Evolution (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 351 Principles of Neurobiology (3) PR: PSYC 103 and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D or PSYC 214; PR or CO: MATH 250

BIOL 352 Neurobiology and Behavior (3) PR: BIOL 351 or PSYC 351 or PSYC 214; PR or CO: MATH 250

BIOL 353 Hormones and Behavior (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 354 Techniques in Neuroscience (4) PR: BIOL 351 or PSYC 351; MATH 250 or PSYC 211 and PSYC 220 or PSYC 250; and instructor permission

BIOL 356 Comparative Biomechanics (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L, and BIOL 211; PR or CO: BIOL 305, MATH 250 and PHYS 101 or 111; or instructor permission.

BIOL 357 Oceanographic Research (4) PR: BIOL 342 and instructor permission; PR or CO: MATH 250

BIOL 360 Introduction to Biometry (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 396 Biophysical Modeling of Excitable Cells (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and PHYS 111 and 111L and PHYS 112 and 112 L or HONS 158 and 158L or BIOL 211 and 211D and BIOL 305 and PHYS 101 and 101L and PHYS 102 and 102L; PR or CO: MATH 250

BIOL 399 Tutorial (1-3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; junior standing and tutor and department chair permission; PR or CO: MATH 250

BIOL 406 Conservation Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341 or permission of instructor; PR or CO: MATH 250

BIOL 410 Applied and Environmental Microbiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; BIOL 310 and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 411 Microtechnique and Cytochemistry (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 412 Capstone in Molecular Biology (3) PR: BIOL 111/111L or HONS 151/151L, BIOL 112/112L or HONS 152/152L, BIOL 211/211D, BIOL 305, BIOL 312, MATH 111, PR or CO: CHEM 351, MATH 250. Students cannot use both BIOL 412 and BIOL 312 towards their major requirements.

BIOL 414 Environmental Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and BIOL 312 or BIOL 313 or CHEM 351 and MATH 250

BIOL 420 General and Comparative Endocrinology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250 and a course in physiology or instructor permission

BIOL 421 Topics in Physiology, Cell, and Molecular Biology of Marine Organisms (3) PR: BIOL 312 or 313; BIOL 321 and instructor permission; PR or CO: MATH 250

BIOL 444 Plant Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 341 or instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 445 Systematic Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; junior standing and at least one upper division course in organismal Biology; PR or CO: MATH 250

BIOL 446 Special Topics in Neuroscience (3) PR: Junior or senior standing and instructor permission; PR or CO: MATH 250

BIOL 447 Seminar in Neuroscience (3) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352; CO: BIOL 448 or PSYC 448; PR or CO: MATH 250
BIOL 448 Bachelor's Essay in Neuroscience (6) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352 and permission of student's major department and the neuroscience program director; PR or CO: MATH 250

BIOL 449 Biology of Coral Reefs (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341; 3.00 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 450 Problems in Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

BIOL 451 Problems in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

BIOL 452 Seminar (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; 2.50 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed; PR or CO: BIOL 305 and MATH 250

BIOL 453 Special Topics (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 455 Seminar in Molecular Biology (2) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305, 312 and 313; PR or CO: BIOL 305 and MATH 250

BIOL 499 Bachelor's Essay (6) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; instructor and department chair permission; PR or CO: MATH 250

BIOL 501 Biology of the Crustacea (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 337; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 502 Special Topics in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 503 Special Topics in Ecology (3-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

Chemistry Requirement

☐ CHEM 101 General Chemistry (3) PR: None; CO: CHEM 101L
☐ CHEM 101L General Chemistry Lab (1) CO: CHEM 101
AND
☐ CHEM 102 Organic and Biological Chemistry (3) PR: CHEM 101 and 101L or CHEM 111 and 111L; CO: CHEM 102L
☐ CHEM 102L Organic and Biological Chemistry Lab (1) CO: CHEM 102

OR

☐ CHEM 111 Principles of Chemistry (3) PR or CO: unless students exempt MATH 111 (via diagnostic testing) or have completed this course as a pre-requisite, they are required to take MATH 111 as a co-requisite; CO: CHEM 111L
☐ CHEM 111L Principles of Chemistry Lab (1) CO: CHEM 111
AND
☐ CHEM 112 Principles of Chemistry (3) PR: CHEM 111 and 111L or HONS 153 and 153L; CO: CHEM 112L (MATH 120 strongly recommended)
☐ CHEM 112L Principles of Chemistry Lab (1) CO: CHEM 112

Mathematics Requirement

☐ MATH 250 Statistical Methods I (3) PR: Either MATH 111, 120 or instructor permission

Notes:
- MATH 250 is a prerequisite for all 300-level BIOL courses.
- CHEM 221 is a recommended course.
- Honors students can take the alternative sequence of HONS191/HONS191L, HONS 192/HONS192L, HONS293/HONS293L, and HONS294/HONS294L in lieu of CHEM 111/111L, CHEM 112/112L, CHEM 231/231L, and CHEM 232/CHEM 232L.
- Honors students can take the alternative sequence of HONS157/HONS157L and HONS 158/HONS158L in lieu of PHYS 111/111L and PHYS112/112L.
FACULTY CURRICULUM COMMITTEE
CHANGE/DELETE PROGRAM FORM

Instructions:
• Please fill out all of the portions of the form that are specified in section B. You must do this before your request can move forward!
• Remember that your changes will not be implemented until the next catalog year at the earliest.
• If you have questions, please start by checking the detailed instructions on the website.
• Please feel free to contact the committee chair with any remaining questions you might have.

A. CONTACT INFORMATION.

Name: Andrew Clark       Phone: 843-953-4879        Email: clarkaj@cofc.edu

School: Science and Mathematics   Department or Program: Biology Major Teaching Option (B.S.)

Name and Acronym of Major: Biology (BIOL)

B. CATEGORY OF REVIEW. Please check all that apply, then fill out the specified parts of the form.

☒ Change Request (fill out all sections)
☐ Add an existing course to requirements or electives
☒ Add a new course to requirements or electives (attach completed course form for each)
☐ Delete courses from requirements or electives
☐ Add or modify concentration*
☐ Add or modify cognate*

*Note: Only concentrations and cognates requiring 18 or more credit hours will be tracked in Banner and Degree Works and noted on the transcript.

☐ Terminate Program (fill out E, G, H, and I)
☐ Terminate degree
☐ Terminate major
☐ Terminate concentration
☐ Terminate cognate

C. GENERAL INFORMATION

Number of Current Credit Hours (for existing program): 65+
Number of Proposed Credit Hours (for changed program): 65+
Catalog Year in which changes will take effect: FALL 2014

D. CURRICULUM. Please list every change you are making below AND attach the current Program of Study Worksheet for this major (http://registrar.cofc.edu/program-of-study-worksheets/index.php) with changes marked in RED. Additions should show where the course will be inserted, deletions should be noted by crossing out the course, and moves indicated with arrows. Distinguish between required and elective courses, and note any prerequisites, corequisites, sequencing, or other restrictions. Provide the catalog description and course list exactly as they should appear in the catalog. For each new course, submit the Curriculum Committee’s Course Form and a sample syllabus.

This form was last updated on 6/6/2013 and replaces all others.
E. RATIONALE AND EXPLANATION. This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Major electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic, terrestrial- and aerial-locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students know and be able to do when they complete the major or program?</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
<tr>
<td>1. At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see page 2) over the incoming first year class performance.</td>
</tr>
<tr>
<td>2. At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by steady performance overall on the Biology MFT compared to performance at the end of the foundation sequence.</td>
</tr>
<tr>
<td>3. At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.</td>
<td>Success is demonstrated by improved group performance for some of the Assessment Indicators (see page 3) on the Biology MFT compared to the end of the foundation sequence.</td>
</tr>
</tbody>
</table>
4. At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

Additional Outcomes or Comments:

G. IMPACT ON EXISTING PROGRAMS AND COURSES. Please describe the impact of this request on other programs and courses. If you are deleting a program, please describe the effect on all programs that will be impacted; if you are adding or changing a program, please explain any overlap with existing programs at the College.

Biology:
As a result of this change, students in this program will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students’ progression through their respective degree programs should be enhanced by this experience.

Other Departments: Exercise Science
EXSC 330 Kinesiology and EXSC 440 Biomechanics: Like BIOL 356, both courses apply basic Newtonian physics to biological systems. However, EXSC 330 and 440 focus on motion analysis and biomechanics of human movement, respectively, whereas BIOL 356 focuses on the biomechanics of a broad range of organisms, including unicellular organisms, plants, invertebrates, and vertebrates, as well as a broad range of biomechanical phenomena, including feeding, aquatic, terrestrial, and aerial locomotion, and material properties. EXSC 330 and 440 do not have an associated laboratory component whereas BIOL 356 includes a laboratory component where students will gain experience using state-of-the-art research tools, techniques, and analyses. It is important to note that BIOL 356 is not a course requirement for any of the Exercise Science programs, and, neither EXSC 330 nor 440 are requirements or prerequisites for BIOL 356.
H. COSTS ASSOCIATED WITH THE REQUESTED ACTION. List all of the new costs or cost savings (including new faculty/staff requests, library, or equipment) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CofC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members' research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

I. CHECKLIST

☒ I have completed all relevant parts of the form.

☒ I have attached a cover letter that describes my request and lists all the documents I am submitting.

☒ I have attached a Course Form for each newly-created or modified course.

☐ N/A For proposals that affect other departments in any way) I have attached an acknowledgement from the relevant department.

☒ I have provided the complete curriculum for the program, concentration, emphasis, etc., including the description and course list, exactly as it should appear in the catalog.

☒ I have submitted one Signature Form that lists all of the different forms I am submitting.
Biology Major Teaching Option and Secondary Cognate Major Requirements
Catalog Year: 2013-14
Degree: Bachelor of Science
Credit Hours: 97+ (Biology 61+; Secondary Cognate 36)

Teacher Education Track (Grades 9-12)

Students interested in teacher certification in biology must complete the following courses and the secondary education cognate major requirements. See the School of Education, Health and Human Performance section of the undergraduate catalog for a listing of the required secondary education cognate major courses. Students should apply for acceptance to this program no later than the second semester of their sophomore year. Requirements for this program include admission to and successful completion of the approved teacher education program. Students must successfully complete all requirements for certification in secondary education.

Notes: When declaring teacher certification in biology through the Program of Study Management System (POSM), students must first select “Declare a Major” and then “Secondary Education Cognate” from the major list. Once this selection is made, a second menu box will appear with a list of the associated majors. Select the biology major and follow the on-screen instructions.

“PR” indicates a pre-requisite. “CO” indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult http://registrar.cofc.edu/general-edu for more information.

Required Courses:

- [ ] BIOL 111 Introduction to Cell and Molecular Biology (3) PR: None; CO: BIOL 111L
- [ ] BIOL 111L Introduction to Cell and Molecular Biology Lab (1) CO: BIOL 111
- OR
- [ ] HONS 151 Honors Biology I (3) PR: None; CO: HONS 151L
- [ ] HONS 151L Honors Biology I Lab (1) CO: HONS 151
- [ ] BIOL 112 Evolution, Form, and Function of Organisms (3) PR: BIOL 111 and 111L; CO: BIOL 112L
- [ ] BIOL 112L Evolution, Form, and Function of Organisms Lab (1) CO: BIOL 112L
- OR
- [ ] HONS 152 Honors Biology II (3) PR: HONS 151 and 151L; CO: HONS 152L
- [ ] HONS 152L Honors Biology II Lab (1) CO: HONS 152
- [ ] BIOL 211 Biodiversity, Ecology, and Conservation Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; CO: BIOL 211D
- [ ] BIOL 211D Biodiversity, Ecology, and Conservation Biology Discussion (0) CO: BIOL 211
- [ ] BIOL 305 Genetics (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D and MATH 250 or instructor permission

19 additional credit hours in courses at the 300-level or above including:

Complete one of the following courses:

- [ ] BIOL 312 Molecular Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250

- [ ] BIOL 313 Cell Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

Complete one of the following laboratories:

- [ ]
BIOL 305L Genetics Lab (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D; BIOL 305 and MATH 250

BIOL 312L Molecular Biology Laboratory (1) PR or CO: BIOL 312 and MATH 250. Students cannot use both BIOL 412 and BIOL 312L towards their major requirements.

BIOL 313L Cell Biology Laboratory (1) PR or CO: BIOL 313 and MATH 250

Complete one of the following courses:

☐ ___________

BIOL 304 Plant Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 321 General and Comparative Physiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250 or equivalent course in statistics or instructor permission

Complete at least one course from the following:

☐ ___________

BIOL 300 Botany (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 302 Plant Anatomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 303 Phycology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 304* Plant Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of chemistry; PR or CO: BIOL 305 and MATH 250

Note: *BIOL 304 may be used to fulfill the other above requirements.

Complete at least one course from the following:

☐ ___________

BIOL 310 General Microbiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 322 Developmental Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 323 Comparative Anatomy of Vertebrates (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 332 Vertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 333 Ornithology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 334 Herpetology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 335 Biology of Fishes (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
BIOL 336  Parasitology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 337  Invertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 338  Entomology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 343  Animal Behavior (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

☐ Select 3-7 credit hours of any 300-level course listed above or from the following:

BIOL 314  Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and one year of Chemistry; PR or CO: MATH 250

BIOL 340  Zoogeography (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 341  General Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 342  Oceanography (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250; one year of college-level Math and one year of college-level Chemistry

BIOL 350  Evolution (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 354  Techniques in Neuroscience (4) PR: BIOL 351 or PSYC 351; MATH 250 or PSYC 211 and PSYC 220 or PSYC 250; and instructor permission

BIOL 356  Comparative Biochemistry (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: BIOL 305; MATH 250 and PHYS 111 or PHYS 121 or instructor permission.

BIOL 406  Conservation Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and BIOL 341 or permission of instructor; PR or CO: MATH 250

BIOL 410  Applied and Environmental Microbiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; BIOL 310 and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 420  General and Comparative Endocrinology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250 and a course in physiology or instructor permission

BIOL 421  Topics in Physiology, Cell, and Molecular Biology of Marine Organisms (3) PR: BIOL 312 or 313; BIOL 321 and instructor permission; PR or CO: MATH 250

BIOL 444  Plant Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 341 or instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 445  Systematic Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; junior standing and at least one upper division course in organismal Biology; PR or CO: MATH 250

BIOL 450  Problems in Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

BIOL 451  Problems in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250

BIOL 452  Seminar (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; 2.50 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed; PR or CO: BIOL 305 and MATH 250

BIOL 453  Special Topics (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and instructor permission; PR or CO: BIOL 305 and MATH 250
Mathematics Requirement
- MATH 120  Introductory Calculus (4) PR: Placement or C- or better in MATH 111
- MATH 250  Statistical Methods I (3) PR: Either MATH 111, 120 or instructor permission

Physics Requirement
- PHYS 101  Introductory Physics (3) PR: None; CO or PR: PHYS 101L
- PHYS 101L Introductory Physics Lab (1) CO: PHYS 101

AND
- PHYS 102  Introductory Physics II (3) PR: PHYS 101 or PHYS 111 or HONS 157; CO: PHYS 102L
- PHYS 102L Introductory Physics Lab (1) CO: PHYS 102

OR
- PHYS 111  General Physics I (3) PR or CO: MATH 120 or equivalent or instructor permission; CO: PHYS 111L
- PHYS 111L General Physics I Lab (1) CO: PHYS 111

AND
- PHYS 112  General Physics II (3) PR: PHYS 111 or HONS 157; CO or PR: MATH 220 or equivalent or instructor permission; CO: PHYS 112L
- PHYS 112L General Physics II Lab (1) CO: PHYS 112

Chemistry Requirement
- CHEM 111  Principles of Chemistry (3) PR or CO: unless students exempt MATH 111 (via diagnostic testing) or have completed this course as a pre-requisite, they are required to take MATH 111 as a co-requisite; CO: CHEM 111L
- CHEM 111L Principles of Chemistry Lab (1) CO: CHEM 111

AND
- CHEM 112  Principles of Chemistry (3) PR: CHEM 111 and 111L or HONS 153 and 153L; CO: CHEM 112L (MATH 120 strongly recommended)
- CHEM 112L Principles of Chemistry Lab (1) CO: CHEM 112

AND
- CHEM 102  Organic and Biological Chemistry (3) PR: CHEM 101 and 101L or CHEM 111 and 111L; CO: CHEM 102L
- CHEM 102L Organic and Biological Chemistry Lab (1) CO: CHEM 102

OR
- CHEM 231  Organic Chemistry (3) PR: CHEM 112 and CHEM 112L or HONS 154 and HONS 154L; CO: CHEM 231L
- CHEM 231L Introduction to Organic Chemistry Laboratory Techniques (1) CO: CHEM 231

Notes:
- MATH 250 is a pre-requisite for all 300-level BIOL courses.
- CHEM 221 is a recommended course.
- Honors students can take the alternative sequence of HONS191/HONS191L, HONS 192/HONS192L, HONS293/HONS293L, and HONS294/HONS294L in lieu of CHEM 111/111L, CHEM 112/112L, CHEM 231/231L, and CHEM 232/232L
- Honors students can take the alternative sequence of HONS157/HONS157L and HONS 158/HONS158L in lieu of PHYS 111/111L and PHYS112/112L

Secondary Cognate Major Requirements

“PR” indicates a pre-requisite. “CO” indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult [http://registrar.cofc.edu/general-edu](http://registrar.cofc.edu/general-edu) for more information.

Students interested in teacher certification in secondary education must complete a content major, additional coursework required for certification (if applicable), and the secondary education cognate major requirements. Content majors are available in biology (Bachelor of Science Teaching Option), chemistry (Bachelor of Arts), English (Bachelor of Arts), history (Bachelor of Arts, for certification in social studies), mathematics (Bachelor of Science teacher education track), physics (Bachelor of Arts). Students must successfully complete all requirements for certification in secondary education.
Required Courses

☐ COMM 104  Public Speaking (3) PR: None

☐ EDFS 201*  Foundations of Education (3) PR: Sophomore standing.

Note: *EDFS 201 is prerequisite to all other education courses with a grade of C or better.

☐ EDFS 303*  Human Growth and the Educational Process (3) PR: None

☐ EDFS 326*  Integrating Technology Into Teaching (3) PR: None

☐ EDFS 330*  Classroom and Behavior Management (3) PR: EDFS 201 and class rank of junior or above

☐ EDFS 345  Introduction to the Education of Exceptional Children and Youth (3) PR: EDFS 303 or equivalent.

☐ EDFS 455  Literacy and Assessment in the Content Areas (3) PR: None

☐ EDFS 456  Teaching Strategies in the Content Areas (English, Math, Science, Social Studies) (3) PR: None

Note: *Candidates who have received credit for PSYC 224 (previously listed as PSYC 311) prior to beginning a teacher education program should not take EDFS 303 (credit will not be awarded). Students must enroll in the Secondary sections for each of the courses marked with an asterisk. (See associate department chair to register for courses.) Each course requires a school-based field experience. Students will need a 3-hour block of time per week between the hours of 7 a.m. and 2 p.m. Monday through Friday, to complete each school-based experience.

Clinical Practice Internship Requirement

☐ EDFS 460*  Clinical Practice in the Content Area (12) PR: Admission to a teacher education program and completion of all education requirements.

Note: *Students seeking recommendation for South Carolina certification in Secondary Education must complete the program of study above and meet the admission, retention, and exit requirements of the program and the School of Education, Health, and Human Performance. Recommendation to the South Carolina Department of Education for certification in South Carolina is contingent upon successful completion of Clinical Practice, and achievement of passing scores on the necessary Praxis II test(s) for recommendation. Students who do not take Clinical Practice may not earn a degree in Secondary Education and will not be recommended for certification. See your faculty advisor for additional information.

Notes:

- You should apply for admission (this is NOT declaring your major) to the Teacher Education Program the semester you are enrolled in EDFS 201 Foundations of Education. Requirements for admission:
  - Minimum overall GPA of 2.50 and 60 earned credit hours.
  - Passing score on the 3 components of the PRAXIS 1: Pre-Professional Skills Test (Reading, Writing, and Mathematics) as designated by the South Carolina Department of Education OR qualifying SAT or ACT scores.
  - Disposition forms from (a) a general education faculty member, (b) your EDFS 201 professor, and (c) someone who has observed you working with children.
  - If a student has transfer credit for a course that is equivalent to EDFS 201, they must meet with the Teacher Education department chair and complete 1 hour of work.
  - A grade of C or better in EDFS 201 Foundations of Education.

- Your admission process must be completed before beginning the professional program.

- You must complete a major in the content area and the cognate major to be forwarded to the State Department of Education for certification.
FACULTY CURRICULUM COMMITTEE
CHANGE/DELETE PROGRAM FORM

Instructions:
- Please fill out all of the portions of the form that are specified in section B. You must do this before your request can move forward!
- Remember that your changes will not be implemented until the next catalog year at the earliest.
- If you have questions, please start by checking the detailed instructions on the website.
- Please feel free to contact the committee chair with any remaining questions you might have.

A. CONTACT INFORMATION.

Name: Andrew Clark           Phone: 843-953-4879            Email: clarkaj@cofc.edu

School: Science and Mathematics

Department or Program: Biology Major with Concentration in Molecular Biology (B.S.)

Name and Acronym of Major: Biology (BIOL)

B. CATEGORY OF REVIEW. Please check all that apply, then fill out the specified parts of the form.

☐ Change Request (fill out all sections)
  ☐ Add an existing course to requirements or electives
  ☒ Add a new course to requirements or electives (attach completed course form for each)
  ☐ Delete courses from requirements or electives
  ☐ Add or modify concentration*
  ☐ Add or modify cognate*

*Note: Only concentrations and cognates requiring 18 or more credit hours will be tracked in Banner and Degree Works and noted on the transcript.

☐ Terminate Program (fill out E, G, H, and I)
  ☐ Terminate degree
  ☐ Terminate major
  ☐ Terminate concentration
  ☐ Terminate cognate

C. GENERAL INFORMATION

Number of Current Credit Hours (for existing program): 65+
Number of Proposed Credit Hours (for changed program): 65+
Catalog Year in which changes will take effect: FALL 2014

D. CURRICULUM. Please list every change you are making below AND attach the current Program of Study Worksheet for this major (http://registrar.cofc.edu/program-of-study-worksheets/index.php) with changes marked in RED. Additions should show where the course will be inserted, deletions should be noted by crossing out the course, and moves indicated with arrows. Distinguish between required and elective courses, and note any prerequisites, co-requisites, sequencing, or other restrictions. Provide the catalog description and course list exactly as they should appear in the catalog. For each new course, submit the Curriculum Committee’s Course Form and a sample syllabus.

This form was last updated on 6/6/2013 and replaces all others.
E. RATIONALE AND EXPLANATION. This course has been taught in the Fall semester during the previous 3 years as BIOL 453 Special Topics: Comparative Biomechanics by Drs. Clark, McElroy, and Vance. We wish to make this course a permanent offering for the fulfillment of Biology Major electives. Comparative biomechanics is a highly interdisciplinary field, which involves the study of organismal structure and function using Newtonian physics to model and understand structure-function relationships, how structure-function relationships regulate animal behaviors, and more broadly, how these relationships connect with organismal ecology, evolution and diversity. The laboratory component of Comparative Biomechanics provides hands-on experience using state-of-the-art techniques and equipment for recording and analyzing the kinematics and kinetics of biomechanical phenomena, including using high-speed videography, force transducers, and MatLab. Drs. Clark, McElroy, and Vance each bring research expertise in comparative biomechanics to the classroom and laboratory exercises and play a collaborative role in developing and executing course objectives during the semester (e.g. guest lectures and laboratory instruction). By doing so, students are provided a broad range of lecture and laboratory experience spanning feeding biomechanics, aquatic-, terrestrial- and aerial-locomotion, and materials biomechanics, each taught by experts in those respective areas, which is unique to all but a select few colleges and universities in the United States.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Assessment Method and Performance Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td>What will students know and be able to do when they complete the major or program?</td>
<td>How will each outcome be measured? Who will be assessed, when, and how often? How well should students be able to do on the assessment?</td>
</tr>
<tr>
<td>1. At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see page 2) over the incoming first year class performance.</td>
</tr>
<tr>
<td>2. At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology.</td>
<td>Success is demonstrated by steady performance overall on the Biology MFT compared to performance at the end of the foundation sequence.</td>
</tr>
<tr>
<td>3. At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.</td>
<td>Success is demonstrated by improved group performance for some of the Assessment Indicators (see page 3) on the Biology MFT compared to the end of the foundation sequence.</td>
</tr>
</tbody>
</table>

This form was last updated on 6/6/2013 and replaces all others.
4. At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

Additional Outcomes or Comments:

G. IMPACT ON EXISTING PROGRAMS AND COURSES. Please describe the impact of this request on other programs and courses. If you are deleting a program, please describe the effect on all programs that will be impacted; if you are adding or changing a program, please explain any overlap with existing programs at the College.

Biology:
As a result of this change, students in this program will have the opportunity to better understand the relationship between organismal form and function, supplementing, but not overlapping, with material taught in BIOL 323 Comparative Anatomy of Vertebrates and BIOL 321 General and Comparative Physiology, while evaluating organismal behavior, ecology and diversity through the lens of physics (e.g. complementing principles taught in BIOL 343 Animal Behavior, 341 General Ecology, and 350 Evolution, respectively). Students will gain experience applying and executing all aspects of the scientific method. Students' progression through their respective degree programs should be enhanced by this experience.

Other Departments: Exercise Science
EXSC 330 Kinesiology and EXSC 440 Biomechanics: Like BIOL 356, both courses apply basic Newtonian physics to biological systems. However, EXSC 330 and 440 focus on motion analysis and biomechanics of human movement, respectively, whereas BIOL 356 focuses on the biomechanics of a broad range of organisms, including unicellular organisms, plants, invertebrates, and vertebrates, as well as a broad range of biomechanical phenomena, including feeding, aquatic, terrestrial, and aerial locomotion, and material properties. EXSC 330 and 440 do not have an associated laboratory component whereas BIOL 356 includes a laboratory component where students will gain experience using state-of-the-art research tools, techniques, and analyses. It is important to note that BIOL 356 is not a course requirement for any of the Exercise Science programs, and, neither EXSC 330 nor 440 are requirements or prerequisites for BIOL 356.
H. COSTS ASSOCIATED WITH THE REQUESTED ACTION. List all of the new costs or cost savings (including new faculty/staff requests, library, or equipment) associated with your request.

None.

Drs. Clark, McElroy, and Vance are all faculty members in the CofC Biology Department who are available and can teach BIOL 356. Instruments, like high-speed video cameras, material testing rigs, and force transducers, are housed in the faculty members' research laboratories, and are readily available for use in the BIOL 356 lab exercises. Also, peer-reviewed journals, subscriptions, and other forms of relevant literature are already available to the students and faculty.

1. CHECKLIST

☒ I have completed all relevant parts of the form.

☒ I have attached a cover letter that describes my request and lists all the documents I am submitting.

☒ I have attached a Course Form for each newly-created or modified course.

☐ N/A (For proposals that affect other departments in any way) I have attached an acknowledgement from the relevant department.

☒ I have provided the complete curriculum for the program, concentration, emphasis, etc., including the description and course list, exactly as it should appear in the catalog.

☒ I have submitted one Signature Form that lists all of the different forms I am submitting.
Biology Major with Concentration in Molecular Biology Requirements
Catalog Year: 2013-14
Degree: Bachelor of Science
Credit Hours: 72+

"PR" indicates a pre-requisite. "CO" indicates a co-requisite.

Courses within this major may also satisfy general education requirements. Please consult http://registrar.cofc.edu/general-edu for more information.

Required Courses

☐ BIOL 111 Introduction to Cell and Molecular Biology (3) PR: None; CO: BIOL 111L
☐ BIOL 111L Introduction to Cell and Molecular Biology Lab (1) CO: BIOL 111

OR
☐ HONS 151 Honors Biology I (3) PR: None; CO: HONS 151L
☐ HONS 151L Honors Biology I Lab (1) CO: HONS 151

☐ BIOL 112 Evolution, Form, and Function of Organisms (3) PR: BIOL 111 and 111L; CO: BIOL 112L
☐ BIOL 112L Evolution, Form, and Function of Organisms Lab (1) CO: BIOL 112L

OR
☐ HONS 152 Honors Biology II (3) PR: HONS 151 and 151L; CO: HONS 152L
☐ HONS 152L Honors Biology II Lab (1) CO: HONS 152

☐ BIOL 211 Biodiversity, Ecology, and Conservation Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; CO: BIOL 211D
☐ BIOL 211D Biodiversity, Ecology, and Conservation Biology Discussion (0) CO: BIOL 211

☐ BIOL 305 Genetics (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; PR or CO: BIOL 211 and 211D and MATH 250 or instructor permission

☐ BIOL 305L Genetics Lab (1) PR or CO: BIOL 305 and MATH 250

☐ BIOL 312 Molecular Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250

☐ BIOL 313 Cell Biology (3) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or CHEM 232 and 232L; PR or CO: MATH 250, BIOL 305 or CHEM 232 and 232L

☐ BIOL 313L Cell Biology Laboratory (1) PR or CO: BIOL 313 and MATH 250

☐ BIOL 412 Capstone in Molecular Biology (3) PR: BIOL 111/111L or HONS 151/151L, BIOL 112/112L or HONS 152/152L, BIOL 211/211D, BIOL 305, BIOL 312, MATH 111 PR or CO: CHEM 351, MATH 250. Students cannot use both BIOL 412 and BIOL 312L towards their major requirements.

☐ Complete 8 credit hours of 300-level or above BIOL courses from the BIOLOGY 300-LEVEL AND ABOVE ELECTIVES LIST for a total of four courses with labs (independent study, tutorial, Bachelor's Essay, or BIOL 450 and 451 with labs do not fulfill the lab requirement).

BIOLOGY 300-LEVEL AND ABOVE ELECTIVES LIST

BIOL 300 Botany (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 301 Plant Taxonomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 302 Plant Anatomy (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 303 Phycology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250
BIOL 304  Plant Physiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 310  General Microbiology (4) PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; and BIOL 211 and 211D or Chem 232 and 232L; PR or CO: MATH 250; BIOL 305 or CHEM 232 and 232L

BIOL 314  Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and one year of Chemistry; PR or CO: MATH 250

BIOL 320  Histology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 321  General and Comparative Physiology PR: One year of Chemistry and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D and BIOL 305 or CHEM 232 and 232L; PR or CO: MATH 250 or equivalent course in statistics or instructor permission

BIOL 322  Developmental Biology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 323  Comparative Anatomy of Vertebrates (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 332  Vertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 333  Ornithology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 334  Herpetology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 335  Biology of Fishes (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 336  Parasitology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 337  Invertebrate Zoology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 338  Entomology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 339  Dinosaur Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 340  Zoogeography (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 341  General Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 342  Oceanography (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250; one year of college-level Math and one year of college-level Chemistry

BIOL 343  Animal Behavior (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250

BIOL 350  Evolution (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; PR or CO: MATH 250
BIOL 351  Principles of Neurobiology (3) PR: PSYC 103 and BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L; BIOL 211 and 211D or PSYC 214; PR or CO: MATH 250

BIOL 352  Neurobiology and Behavior (3) PR: BIOL 351 or PSYC 351 or PSYC 214; PR or CO: MATH 250

BIOL 353  Hormones and Behavior (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 354  Techniques in Neuroscience (4) PR: BIOL 351 or PSYC 351; MATH 250 or PSYC 211 and PSYC 220 or PSYC 250; and instructor permission

BIOL 356  Comparative Biomechanics (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L, and BIOL 211; PR or CO: BIOL 305, MATH 250 and PHYS 101 or 111; or instructor permission.

BIOL 357  Oceanographic Research (4) PR: BIOL 342 and instructor permission; PR or CO: MATH 250

BIOL 360  Introduction to Biomety (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250

BIOL 396  Biophysical Modeling of Excitable Cells (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and PHYS 111 and 111L and PHYS 112 and 112L or HONS 158 and 158L or BIOL 211 and 211D and BIOL 305 and PHYS 101 and 101L and PHYS 102 and 102L; PR or CO: MATH 250

BIOL 399  Tutorial (1-3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; junior standing and tutor and department chair permission; PR or CO: MATH 250

BIOL 406  Conservation Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and BIOL 341 or permission of instructor; PR or CO: MATH 250

BIOL 410  Applied and Environmental Microbiology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; BIOL 310 and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 411  Microtechnique and Cytocchemistry (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and MATH 250

BIOL 414  Environmental Immunology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and one year of Chemistry; PR or CO: BIOL 305 and BIOL 312 or BIOL 313 or CHEM 351 and MATH 250

BIOL 420  General and Comparative Endocrinology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; PR or CO: BIOL 305 and MATH 250 and a course in physiology or instructor permission

BIOL 421  Topics in Physiology, Cell, and Molecular Biology of Marine Organisms (3) PR: BIOL 312 or 313; BIOL 321 and instructor permission; PR or CO: MATH 250

BIOL 444  Plant Ecology (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 341 or instructor permission; PR or CO: BIOL 305 and MATH 250

BIOL 445  Systematic Biology (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; junior standing and at least one upper division course in organismal Biology; PR or CO: MATH 250

BIOL 446  Special Topics in Neuroscience (3) PR: Junior or senior standing and instructor permission; PR or CO: MATH 250

BIOL 447  Seminar in Neuroscience (3) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352; CO: BIOL 448 or PSYC 448; PR or CO: MATH 250

BIOL 448  Bachelor's Essay in Neuroscience (6) PR: BIOL 351 or PSYC 351 and BIOL 352 or PSYC 352 and permission of student's major department and the neuroscience program director; PR or CO: MATH 250

BIOL 449  Biology of Coral Reefs (3) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 301 and 341; 3.00 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250

BIOL 450  Problems in Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250
<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 451</td>
<td>Problems in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in science courses; junior standing and instructor and department chair permission; PR or CO: MATH 250</td>
</tr>
<tr>
<td>BIOL 452</td>
<td>Seminar (1) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D; 2.50 GPA or higher in BIOL; junior standing and 15 credit hours of BIOL completed; PR or CO: BIOL 305 and MATH 250</td>
</tr>
<tr>
<td>BIOL 453</td>
<td>Special Topics (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and instructor permission; PR or CO: BIOL 305 and MATH 250</td>
</tr>
<tr>
<td>BIOL 499</td>
<td>Bachelor's Essay (6) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL; instructor and department chair permission; PR or CO: MATH 250</td>
</tr>
<tr>
<td>BIOL 501</td>
<td>Biology of the Crustacea (4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 337; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250</td>
</tr>
<tr>
<td>BIOL 502</td>
<td>Special Topics in Marine Biology (1-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250</td>
</tr>
<tr>
<td>BIOL 503</td>
<td>Special Topics in Ecology (3-4) PR: BIOL 111 and 111L or HONS 151 and 151L and BIOL 112 and 112L or HONS 152 and 152L and BIOL 211 and 211D and BIOL 305 and 341; 3.00 GPA or higher in BIOL and junior standing and 15 credit hours of BIOL completed or instructor and department chair permission; PR or CO: MATH 250</td>
</tr>
</tbody>
</table>

**Chemistry Requirement**

- **CHEM 111** Principles of Chemistry (3) PR or CO: unless students exempt MATH 111 (via diagnostic testing) or have completed this course as a prerequisite, they are required to take MATH 111 as a co-requisite; CO: CHEM 111L
- **CHEM 111L** Principles of Chemistry Lab (1) CO: CHEM 111

- **CHEM 112** Principles of Chemistry (3) PR: CHEM 111 and 111L or HONS 153 and 153L; CO: CHEM 112L (MATH 120 strongly recommended)
- **CHEM 112L** Principles of Chemistry Lab (1) CO: CHEM 112

- **CHEM 231** Organic Chemistry (3) PR: CHEM 112 and CHEM 112L or HONS 154 and HONS 154L; CO: CHEM 231L
- **CHEM 231L** Introduction to Organic Chemistry Laboratory Techniques (1) CO: CHEM 231

- **CHEM 232** Organic Chemistry (3) PR: CHEM 231 and CHEM 231L; CO: CHEM 232L
- **CHEM 232L** Organic Synthesis and Analysis (1) CO: CHEM 232

- **CHEM 351** Biochemistry (3) PR: CHEM 232, CHEM 232L

- **CHEM 352** Biochemistry II (3) PR: CHEM 351
- **CHEM 354L** Biochemistry II Laboratory (1) PR: CHEM 351

**Physics Requirement**

- **PHYS 101** Introductory Physics (3) PR: None; CO or PR: PHYS 101L
- **PHYS 101L** Introductory Physics Lab (1) CO: PHYS 101

  **AND**

- **PHYS 102** Introductory Physics II (3) PR: PHYS 101 or PHYS 111 or HONS 157; CO: PHYS 102L
- **PHYS 102L** Introductory Physics Lab (1) CO: PHYS 102

  **OR**

- **PHYS 111** General Physics I (3) PR or CO: MATH 120 or equivalent or instructor permission; CO: PHYS 111L
- **PHYS 111L** General Physics I Lab (1) CO: PHYS 111

  **AND**

- **PHYS 112** General Physics II (3) PR: PHYS 111 or HONS 157; CO or PR: MATH 220 or equivalent or instructor permission; CO: PHYS 112L
- **PHYS 112L** General Physics II Lab (1) CO: PHYS 112
Mathematics Requirement

☐ MATH 120  Introductory Calculus (4) PR: Placement or C- or better in MATH 111

☐ MATH 250  Statistical Methods (3) PR: Either MATH 111, 120 or instructor permission

Notes:

- MATH 250 is a prerequisite for all 300-level BIOL courses.

- CHEM 221 is a recommended course.

- Honors students can take the alternative sequence of HONS191/HONS191L, HONS 192/HONS192L, HONS293/HONS293L, and HONS294/HONS294L in lieu of CHEM 111/111L, CHEM 112/112L, CHEM 231/231L and CHEM 232/CHEM 232L

- Honors students can take the alternative sequence of HONS 157/HONS 157L and HONS 158/HONS 158L in lieu of PHYS 111/111L and PHYS112/112L