FACULTY CURRICULUM COMMITTEE COURSE FORM

Contact Name: Chris Korey Email: koreyc@cofc.edu Phone: 3-7178

Department or Program Name: Biology School name: SSM

Course Prefix, Number, and Title: BIOL 412 Capstone in Molecular Biology

I. CATEGORY OF REVIEW (Check all that apply)
(Note: For changes to course, if you check more than two separate changes, you must create a new course.)

NEW COURSE

CHANGE COURSE

DELETE COURSE

X New Course (attach syllabus)

☐ Change Number ☐ Re-activate Course
☐ Change Title ☐ Delete Course
☐ Change Credits/Contact hours
☐ Prerequisite Change
☐ Edit Description

☐ Approve for Cross-listing (attach rationale and written permission from relevant department)

☐ Intended to fulfill a General Education requirement (new courses only). If this box is checked, the course must also be submitted for review by the General Education Committee using this form.

Date (Semester/Year) the course will first be offered: Fall 2012

What are the prerequisites AND OTHER RESTRICTIONS (e.g., class level, major, co-requisite, credit for a mutually exclusive course)?

Prerequisite: BIOL 211/211D, BIOL 305, BIOL 312
Pre or co-requisite: CHEM 351.
Students cannot use both BIOL412 and BIOL312L towards their major requirements.

Will this course be added to the Degree Requirements of a Major, Minor, Concentration or List of Approved Electives?

a) X Yes ☐ No

b) If yes, complete and attach the CHANGE DEGREE REQUIREMENT form(s) for each affected program. List the name(s) of each program affected below:

BS Biology, Molecular Biology concentration

II. NUMBER OF CREDITS and CONTACT HOURS per week

A. Contact Hours

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Lab</th>
<th>Seminar</th>
<th>Ind. Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. Credit Hours

3

Is this course repeatable? ☐ yes X no If so, how many credit hours may the student earn in this course?
III. CATALOG DESCRIPTION  Limit to 50 words EXACTLY as you want it to appear in the catalog; include prerequisites, co-requisites, and other restrictions.

An intensive seminar and laboratory course that serves as the culminating capstone experience for Molecular Biology concentrators. This course will be a synthesis of the field, integrating paper discussion, experimental design, and modern laboratory research techniques. Prerequisites BIOL 211/211D, BIOL305, BIOL 312; Pre or co-requisite: CHEM 351. Students cannot use both BIOL 412 and BIOL312L towards their major requirements.

IV. RATIONALE or JUSTIFICATION: If course change or deletion—please provide reasons for change(s) to or deletion of a course. If a new course—briefly address the goals/objectives for the course, how the course supports a major or minor program, etc. For non-major courses address how the course supports the liberal arts tradition and the mission of the institution.

This course will be a new capstone course for students who are concentrating in Molecular Biology. The course will provide a rigorous combined laboratory techniques/seminar experience to students as the culminating course in their Molecular Biology studies. Previously, these students would have taken two separate courses (BIOL312L and BIOL455) to fulfill these two aspects of their curriculum.

By combining the laboratory and seminar courses we will:

1) offer the students an integrated synthesis experience that combines laboratory work and paper discussion in a more cohesive format. The course will be more similar to a "real" research environment where they will perform experiments while reading and discussing related primary literature.

2) create a Molecular Biology Concentration curriculum and staffing plan that maximizes our ability to consistently offer courses to concentrators, more regularly offer other 300 level courses, and allow roster faculty to rotate into Biology 111 (Introduction to Cell and Molecular Biology) and Biology 305 (Genetics), which are required courses.

V. 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. Read and critique primary literature from scientific journals in the molecular and genomics field.</td>
<td>Class discussion and student oral presentations through out the semester.</td>
</tr>
<tr>
<td>2. Understand the scientific approach and be able to design experiments to test a hypothesis.</td>
<td>Student will design experimental protocols and carry them through in the laboratory portion of the course.</td>
</tr>
<tr>
<td>3. Assimilate and use complex concepts in the molecular biology and genomics fields</td>
<td>Students will write short essays on specific aspects of the course such as article critique, topical short reviews and lab reports.</td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
</tbody>
</table>
How does this course 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 course?

This course reinforces the goals of the Molecular Biology concentration by better training students to think and work as scientists, making them more competitive for admission into both graduate and professional programs. The curriculum of this course will introduce modern research techniques while reinforcing previous learning from the Molecular Biology curriculum. Finally, students will be encouraged to demonstrate an ability to synthesize their knowledge and apply it to research problems in Molecular Biology. Students will take this course towards the end of their major/concentration. This course will be a new capstone for the Molecular Biology concentration majors.

VII. IMPACT ON EXISTING PROGRAMS and COURSES: Please briefly document the impact of this new/changed/deleted course on other programs and courses; if deleting a course—list all programs that include the course; if adding/changing a course—explain any overlap with existing courses in the same or different departments.

Offering this course will free spaces in the regular BIOL312 lab, because Molecular Biology concentration students will no longer have to take that lab. This will in turn allow more Biology BS students and Biochemistry BS students to register for the BIOL312 lab. The standard BIOL312 laboratory does not have a seminar component.

VIII. COSTS ASSOCIATED WITH THE ACTION REQUESTED: List all of the new costs or cost savings, (including new faculty/staff requests, library or equipment, etc.) associated with the action requested.

None

IX. APPROVAL AND SIGNATURES

1. Signature of Department Chair or Program Director: ___________________________ Date: 16 November 2011

2. Signature of Academic Dean: ___________________________ Date: 7 December 2011

3. Signature of Provost: ___________________________ Date: 12/28/11

4. Signature of Curriculum Committee Chair: ___________________________ Date: ____________

5. Signature of Faculty Senate Secretary: ___________________________ Date: ____________

Date Approved by Faculty Senate: ___________________________

Following Senate approval, the Faculty Senate Secretary will forward the entire packet to the Registrar.
To: Jaap Hilleniuss, Chair, BIOL

From: Chris Starr, Chair, CSCI

Date: 10/31/11

Re: BIOL curriculum change proposal

Thank you for the notice of change to BIOL 312/312L. I understand that the change will not effect the Molecular Biology cognate or the students taking it currently and in the future. Thus as director of the Discovery Informatics program, I am in full support of your change request for Biology.
November 15, 2011

Letter of Support for Molecular Biology Curriculum Change

The Department of Chemistry & Biochemistry supports the curricular change proposed by the Department of Biology for the Molecular Biology emphasis track of BS Biology majors. We also support the new course BIOL 412 Capstone in Molecular Biology. We are grateful for the cooperation of the Biology department in placing Biochemistry majors who have completed/are completing CHEM 232/232L into BIOL 312/312L and remain confident in their ability to continue to accommodate BS Biochemistry majors with placement into the BIOL 312 and 312L. Both BIOL 312 and BIOL 312L are required for the BS Biochemistry major.

Rick Heldrich
Interim Chair
Chemistry & Biochemistry
FACULTY CURRICULUM COMMITTEE CHANGE/DELETE PROGRAM FORM

Contact Name: Chris Korey    Email: koreyc@cofc.edu    Phone: 3-7178

Department and School Name: Biology/SSM    Name and Acronym of Program: BIOL

Date (Semester/Year) changed/deleted program will take effect: Fall 2012

I. CATEGORY OF REVIEW (Check all that apply)

☐ Terminate Program (check one): ☐ Degree ☐ Major ☐ Emphasis (concentration/track)
(if checked, skip section II, IV, V, and VII below)

☒ Change Request (attach details):
☐ Add existing course or courses to requirements or electives
☒ Add new course(s) to requirements or electives (complete and attach COURSE FORM for each)
☒ Delete courses from requirements or electives
☐ Add new emphasis (check one): ☐ concentration ☐ track Total # of hours:
(note: any emphasis involving more than 18 credit hours will also require CHE approval)

☐ Interdisciplinary (attach evidence of compliance with guidelines and acknowledgement from relevant
departments. Guidelines can be found: http://currcomm.cofc.edu/guidelines-interdisc/index.php)

II. DESCRIPTION OF CHANGES: If a changed program—please explain changes here; if a new emphasis—please provide the details here.

Changes affect the Molecular Biology emphasis only, not the “regular” BS Biology. ☑

Add BIOL 412 as a required course

Delete BIOL 312L and BIOL 455 from the requirements

III. RATIONALE or JUSTIFICATION For changes or termination, please provide a detailed justification.
For a new emphasis, briefly address the goals/objectives for the new emphasis, provide evidence of student interest (i.e., has the program offered special topics courses in this area? has the program interviewed student focus groups as part of an internal assessment? etc.), and explain how the emphasis supports the liberal arts tradition and the mission of the institution.

This course will be a new capstone course for students who are concentrating in Molecular Biology. The course will provide a rigorous combined laboratory techniques/seminar experience to students as the culminating course in their Molecular Biology studies. Previously, these students would have taken two separate courses (BIOL312L and BIOL455) to fulfill these two aspects of their curriculum. By combining the laboratory and seminar courses we will offer the students an integrated synthesis experience that combines laboratory work and paper discussion in a more cohesive format. The course will be more similar to a "real" research environment where they will perform experiments while reading and discussing related primary literature.
IV. CURRICULUM

A. Provide the complete curriculum for the changed program and/or new emphasis distinguishing between required and elective courses. Note pre-requisite courses where appropriate. Note any sequencing of courses or requirements in the program.

B. Provide the COMPLETE curriculum for the changed program and/or new emphasis distinguishing between required and elective courses. Note pre-requisite courses where appropriate. Note any sequencing of courses or requirements in the program, listed exactly as it should appear in the catalog. Attach the completed COURSE FORM and a sample syllabus for each new course.

Bachelor of Science with concentration in molecular biology: 34 hours
BIOL 111/111L Introduction to Cell and Molecular Biology (with laboratory)
BIOL 112/112L Evolution, Form, and Function of Organisms (with laboratory)
BIOL 211/211D Biodiversity, Ecology, and Conservation Biology
BIOL 305/305L Genetics and Genetics Laboratory
BIOL 312 Molecular Biology
BIOL 313/313L Cell Biology (with laboratory)
BIOL 412 Capstone in Molecular Biology
and 8 additional semester hours in biology courses at the 300 level or above.
NOTE: Students must complete at least one additional biology course with laboratory at the 300 level or above for a total of four laboratories at the 300 level or above. The laboratory courses may carry separate credit or may be part of a four-credit (4) course. Independent study (HONS 398), Tutorial (BIOL/HONS 399), Bachelor's Essay (BIOL/HONS 499), or problems courses (BIOL 448, 450, 451) with laboratories do not fulfill the laboratory requirement.

One year of physics
The following courses:
CHEM 111/111L Principles of Chemistry (with laboratory)
CHEM 112/112L Principles of Chemistry (with laboratory)
CHEM 231/231L Organic Chemistry (with laboratory)
CHEM 232/232L Organic Chemistry (with laboratory)
CHEM 351 Biochemistry I
CHEM 352 Biochemistry II
CHEM 354L Biochemistry Laboratory
MATH 120 Introductory Calculus
MATH 250 Statistical methods (or equivalent course in Statistics)
NOTE: CHEM 221 Quantitative Analysis is an additional recommended course.

V. STUDENT LEARNING OUTCOMES and ASSESSMENT

<table>
<thead>
<tr>
<th>Program-Level 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 program/emphasis? Attach 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>
<tr>
<td>1. Quantitative Reasoning in Biology</td>
<td>The Biology Department is planning on doing an initial assessment of this in the second year of the Biology Major</td>
</tr>
<tr>
<td>2. Ability to apply the process of Science</td>
<td>The Biology Department is planning on doing an initial assessment of this in the second year of the Biology Major</td>
</tr>
<tr>
<td>3. Ability to communicate scientific results</td>
<td>The Biology Department is planning on doing an initial assessment of this in the second year of the Biology Major</td>
</tr>
</tbody>
</table>
Additional Outcomes or Comments:
The change to the curriculum is focused on the capstone experience only and not the general Biology curriculum. I have indicated in the space above, the three places where the Biology curriculum will be initially assessed. Students in the Molecular Biology Emphasis will be part of that assessment process. The addition of a new capstone will have an assessment that is part of that course and is described in the new course form. The curriculum of this course will introduce modern research techniques while reinforcing previous learning from the Molecular Biology curriculum. Finally, students will be encouraged to demonstrate an ability to synthesize their knowledge and apply it to research problems in Molecular Biology. In the attached curriculum map, the course will allow students to demonstrate ability in the three areas that are the focus of Biology department assessment.

VI. IMPACT ON EXISTING PROGRAMS and COURSES
Please briefly document the impact of this changed/deleted program or new emphasis on other programs and courses; if changing/deleting a program—list all programs that will be impacted (and how); if adding a new emphasis—explain any overlap with existing programs or courses in the same or different departments.

If there is an impact, it will be positive one. In addition to the improved pedagogical approach for the Molecular Biology emphasis, this change will allow a staffing plan that maximizes the Biology Department’s ability to consistently offer courses to concentrators, more regularly offer other 300 level courses, and allow roster faculty to rotate into Biology 111 (Introduction to Cell and Molecular Biology) and Biology 305 (Genetics) which are required courses.

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

There are no new costs associated with this course.
VIII. APPROVAL and SIGNATURES

1. Signature of Department Chair or Program Director:
   [Signature]
   Date: 16 November 2011

2. Signature of Academic Dean:
   [Signature]
   Date: 7 December 2011

3. Signature of Provost:
   [Signature]
   Date: 12/28/11

4. Signature of Curriculum Committee Chair:
   [Signature]
   Date: __________

5. Signature of Budget Committee Chair:
   [Signature]
   Date: __________

6. Signature of Academic Planning Committee Chair:
   [Signature]
   Date: __________

7. Signature of Faculty Senate Secretary:
   [Signature]
   Date: __________

Date Approved by Faculty Senate: ________________

Following Senate approval, the Faculty Senate Secretary will forward the entire packet to the Registrar.
# Biology Curriculum Map

<table>
<thead>
<tr>
<th>Course number (BIOLXXX)</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantitative reasoning in biology</td>
</tr>
<tr>
<td>111</td>
<td>L</td>
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<tr>
<td>111L</td>
<td>L</td>
</tr>
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<td>112</td>
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<tr>
<td>112L</td>
<td>L</td>
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<tr>
<td>211</td>
<td>L</td>
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<tr>
<td>211D</td>
<td>L,D</td>
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<tr>
<td>305</td>
<td>R,D</td>
</tr>
<tr>
<td>305L</td>
<td>R,D</td>
</tr>
<tr>
<td>19 Hours at the 300 level</td>
<td>R,D</td>
</tr>
<tr>
<td>412</td>
<td>D</td>
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</table>