1-1-2012

# Academic Learning Compact : Biology [Effective 2012]

University of South Florida St. Petersburg.

Academic Learning Compacts

# BIOLOGY

2012 – 2013

Due: May, 2013

***Signature Page for Academic Program***

Academic Program: BIOLOGY

Chair/Coordinator: _Melanie Riedinger-Whitmore_____ Date: 6/10/13_____

## Summary Statement – Academic Program Performance in 2012-13

Provide a summary statement about academic program performance over the previous year including high points and low points.

In the first year of the Biology program, we have grown quietly rapidly, and we now support ~ 500 Biology majors. Projections for Summer/Fall 2013 indicate that we will gain ~150-200 new majors, a mix of FTIC and transfer students. Our program is also expanding, as we began offering more elective courses during the spring semester to satisfy the degree requirements for our students. Starting in last fall, we expanded our schedule for core courses, offering multiple laboratory sections for Cell Biology, Genetics, and Ecology. One challenge that we will need to address is how to ensure consistency in content and ALC application when we have multiple laboratory and lecture sections, and when many of these courses are taught by part-time faculty, or graduate teaching assistants. In our first year, the Department of Biological Sciences used the ALC's to set a baseline to guide future program development. For most ALC's, students met or exceeded our ALC expectations. One area that needs attention in the future is the service ALC section. We have discovered that it's unrealistic at this point to expect half of the Biology students to be working in an internship, on research project or participate in a program club. With ~500 majors, our small department can not provide the mentoring and oversight needed for this. Additionally, we lack sufficient research space to allow a large number of students to participate in laboratory research in a given semester. We are adjusting the expectation for this section for 2013-2014, examining core or elective courses that might provide opportunities for service activities, with hopes that this is a more realistic expectation.

## Summary Statement – Impact of Changes Made in 2012-13

Provide a summary statement about changes that were made in your program as a result of ongoing assessment in 2012-13 and the positive/negative impact of the changes that were made.

This was the first year for our program, and some of the changes we made were the result of ongoing implementation of major program changes that had been approved just prior to the start of our new degree. In most cases, it is too soon to assess the impact of some of these changes because they involve courses that might have only been taught once or twice. We will now be offering multiple sections of our core courses, and many of

our elective courses. Full-time and part-time faculty teaching the same course are now more strongly encouraged to coordinate schedules and expectations with each other, to ensure that there is consistency in content and outcomes. We now provide TA workshops at the beginning of each semester, to more clearly set course expectations, and to make sure that TAs understand teaching responsibilities and course objectives. We are now only hiring TAs who have a B.S. in Biology, and who are working toward graduate degrees in a biological field. We are doing this so that our laboratory TAs have a sufficient biology background to address content and questions within their lab courses, and so that they can help serve as peer-mentors for our advanced undergraduate students. We are working more closely with advising to try to understand our student population in terms of their backgrounds and needs. Many of our students completed some core and elective courses prior to the start of our Biology degree in Fall 2012, because they were aware that the degree would be available to them. In our first year, a large number of FTIC and transfer students declared Biology as a major, and the major challenges we face right now are trying to sort out how to create schedules that fit the current needs of these students, how to guide them into an appropriate sequence of courses that give them the best opportunity to develop the skills they will need to successfully complete upper-level courses, and how to track their individual success, particularly when they might have taken some of their core or elective courses from other campuses within the UFS system or from local community colleges.
One thing that has worked quite well is that our department maintains a running dialogue between our part-time and full-time faculty about student success and course expectations, and this openness is allowing us to pinpoint potential issues early. Starting this fall, we will host a department meeting prior to the start of classes that is dedicated to discussing the implementation and modification of our ALCs. At that time, we will clarify expectations with our part-time and full-time faculty, and we will use this as an opportunity to discuss changes that need to be implemented to support greater student success in our program, and to better track the ALCs.

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**Academic Program: Biology**
**Person Responsible: Melanie Riedinger-Whitmore, Chairperson, Department of Biological Sciences**

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**Mission of Academic Program (include URL):**
The Biology curriculum is designed to introduce students to research methods in the Biological Sciences, and to help them develop critical thinking skills as well as competency in scientific writing and quantitative analysis. A Biology degree prepares students for professional schools (medicine, dentistry, veterinary medicine, pharmacology, physical therapy), graduate programs in the life sciences (botany, animal behavior, cell biology, ecology, zoology, microbiology, marine biology, molecular biology, biomedicine, biotechnology), and other STEM-related fields. Students majoring in Biology complete core course work in cell biology, ecology, evolution, genetics and physiology, and can select elective courses from three areas of emphasis: a) Biomedical Sciences, b) Marine Biology, and c) Ecology and Evolution. Our students can also tailor their elective course choices to satisfy their own academic or research interests. Undergraduate research experience is a capstone requirement for this degree, and students are provided many opportunities to work closely with Biology faculty on field or laboratory-based research projects. Internship opportunities are available for Biology majors through local state and federal government agencies, nonprofit groups, and at biomedical facilities adjacent to the USFSP campus.
http://www1.usfsp.edu/catalog-undergrad/biology-bio.htm

**List Program Goal(s) / Objective(s):**
**Program Goals / Objectives must be mapped to College Goals / Objectives – use consistent nomenclature.**
[Please note impact of any changes that were made as a result of 2009-10 assessment]

The Biology program began in Fall 2012, and within the first semester attracted over 550 Biology majors. This tremendous growth and student response has prompted the faculty of the Department of Biological Sciences to re-evaluate our initial goals and assessment outcomes in response to this great demand. Since we are truly establishing the foundation for this degree, we have decided to base our goals/objectives on the recent American Association for the Advancement of Science "Vision and Change in Undergraduate Biology Education: A Call to Action - Final Report 2011 (http://visionandchange.org/files/2011/03/Revised-Vision-and-Change-Final-Report.pdf; http://visionandchange.org/; The goals/objectivesrecommended by AAAS are:

1. **Integrate core concepts and competencies throughout the curriculum**
   Introduce the scientific process to students early, and integrate it into all undergraduate biology courses. Define learning goals so that they focus on teaching students the core concepts, and align assessments so that they assess the students' understanding of these concepts. Relate abstract concepts in biology to real-world examples on a regular basis, and make biology concepts relevant by presenting problems in a real-life context. Develop lifelong science-learning competencies. Introduce fewer concepts, but present them in greater depth. Stimulate the curiosity students have for learning about the natural world. Demonstrate both the passion scientists have for their discipline and their delight in sharing their understanding of the world with students.
2. **Focus on student-centered learning**
   Engage students as active participants, not passive recipients, in all undergraduate biology courses. Use multiple modes of instruction in addition to the traditional lecture. Ensure that undergraduate biology courses are active, outcome oriented, inquiry driven, and relevant. Facilitate student learning within a cooperative context. Introduce research experiences as an integral component of biology education for all students, regardless of major. Integrate multiple forms of assessment to track student learning. Give students ongoing, frequent, and multiple forms of feedback on their progress. View the assessment of course success as similar to scientific research, centered on the students involved, and apply the assessment data to improve and enhance the learning environment.
3. **Promote a campus-wide commitment to change**
   Mobilize all stakeholders, from students to administrators, to commit to improving the quality of undergraduate biology education. Support the development of a true community of scholars dedicated to advancing the life sciences and the science of teaching. Advocate for increased status, recognition, and rewards for innovation in teaching, student success, and other educational outcomes. Require graduate students in the biological sciences to participate in training in how to teach biology. Provide teaching support and training for all faculty, but especially postdoctoral fellows and early-career faculty, who are in their formative years as teachers.
4. **Engage the Biology community in the implementation of change**
   Promote more concept-oriented undergraduate biology courses, and help all students learn how to integrate facts into conceptual contexts. Ensure that all undergraduates have authentic opportunities to experience the processes, nature, and limits of science. Create active-learning environments for all students, even those in first-year biology courses. Encourage all biologists to move beyond the "depth versus breadth" debate. Less really is more.

**Academic Program: Biology**
**Person Responsible: Melanie Riedinger-Whitmore, Chairperson, Department of Biological Sciences**

| **I. Content/Discipline Skills** | | | | |
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| **Goals/Objectives** | **Means of Assessment/ Corroborating Evidence*** | **Criteria for Success** | **Findings** | **Plan for Use of Findings in 2013-14** |
| Demonstrate ability to communicate evolutionary processes | PCB 4674 - Organic Evolution:<br>Complete research project on at least 10 evolutionary processes with at least 10 primary references | 90% of students complete a research project on at least 10 evolutionary processes with a minimum grade 75%. | >90% of students completed a PowerPoint presentation that touched on 12 evolutionary processes with grades exceeding 75%. | Change to PP presentation. |
| Demonstrate ability to communicate the structure and Function of cell processes and organismal diversity. | Biology I, BSC 2010/2010L, Cell Processes:<br>Complete lab reports on at least 3 topics of cell structure and function.<br><br>Biology II, BSC 2011. Organismal Diversity: -<br>Complete 5 lab reports on at least 8 topics of organismal diversity. | 80% of students complete at least 3 lab reports on essential cell processes with a minimum grade of 75%<br><br>Bio II: 80% of students complete at least 3 of 5 lab reports with a minimum grade of 75%. | Bio I: >80% (164/197) students scored 75% or better on all three written lab reports<br><br>Bio II: >80% of the students completed 5 of 5 labs reports with 75% or higher. | Bio I: the assessment will be same but criteria will be 80% of students have an **average** of at least 75% on the three reports to reflect overall performance and improvement.<br><br>Bio II: Continue the same process and determine with TA's whether to add one more lab report into the semester. |
| Demonstrate ability to analyze genetic sequences and infer evolutionary relationships. | PCB 3063L – Genetics Lab | 80% of students complete a lab experiment report on the use of DNA sequence data in phylogenetic reconstructionwith a minimum grade of 75% | Exactly 80% of students scored 75% or better on the written paper assignment. | The same metric will be used, with improved discussion of expectations and science writing techniques earlier in the semester. |
| Demonstrate ability to communicate the function of cell processes. | PCB 3023 – Cell Biology, | 80% of students complete a summary/synthesis paper of a primary or secondary literature article on energy transformation with a minimum grade of 75% | >90% completed the assignment with a score of 75% or better | The same metric will be used. |
| Demonstrate the ability to apply concepts from other sciences to interpret biological Phenomena. | PCB 3043 – Principles of Ecology,<br><br>Present seminar describing the historical development of an ecological hypothesis, and methods used to examine hypothesis. | 80% of students complete presentation with a minimum grade of 75% | 100% of the students completed a presentation with a minimum grade of 75% | The same metric will be used. |

*Please include multiple assessments. For example: students perform well on classroom assignments, norm-referenced tests/surveys, and they get accepted to graduate school or are employed.

| II. Communication Skills | | | | |
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| **Goals/Objectives** | **Means of Assessment/ Corroborating Evidence*** | **Criteria for Success** | **Findings** | **Plan for Use of Findings in 2013-14** |
| Demonstrate ability to accurately, clearly and succinctly communicate scientific concepts, interpretations and conclusions to scientific peers. | 1. Complete comprehensive "clarity audit" of scientific paper: assess sentence structure, word choice, grammar and style. | Marine Biology Seminar and Biology Senior Seminar: 80% of students complete "clarity audit" with a minimum grade of 75% | N/A | Will start Fall 2013 |

| III. Critical Thinking Skills | | | | |
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| **Goals/Objectives** | **Means of Assessment/ Corroborating Evidence*** | **Criteria for Success** | **Findings** | **Plan for Use of Findings in 2013-14** |
| Ability to apply the process of science: Design scientific process to understand living systems | BSC 2010-Biology I, BSC 2011 – Biology II, PCB 3063-Genetics, PCB 3023-Cell Biology, PCB 3043- Principles of Ecology BSC 4910 – Undergraduate Research Laboratory experiments, and lab reports | BSC 2010L: 80% of students complete 3 lab reports which apply scientific principles of hypothesis testing and model primary science literature format and style with a minimum grade of 75% | Bio II: 5 lab reports were completed with 85% of the students completing all of them with a 75% or higher. | Bio II: Same process as 2012-13 |
| Ability to use quantitative reasoning: Apply quantitative analysis to interpret biological data | BSC 2010-Biology I, BSC 2011 – Biology II, PCB 3063-Genetics, PCB 3023-Cell Biology, PCB 3043- Principles of Ecology, BSC 4910 – Undergraduate Research Laboratory experiments, and lab reports | 80% of students complete assignments with a minimum grade of 75% | >85% of students completed a research project and presented a poster with a grade of at least 75%. For PCB 3043, > 95% of the students completed essays requiring quantitative analysis with grades > 75% | Expand goal to include lab research project in PCB 3043L. |
| Ability to use modeling and simulation: Use mathematical modeling and simulation tools to describe living systems | PCB 3043-Principles of Ecology Use ecological simulations to model predator/prey and competition experiments, and Interpret data collected. | 80% of students complete assignments with a minimum grade of 75% | This was an ungraded lab exercise. 100% of the students used simulation models and interpreted data generated by their lab group during the exercise. | Use simulations in lecture as a tool to introduce topic to students prior to lab exercise. |
| Ability to understand the relationship between science and society: Identify social and historical dimensions of biology practice | MMC 2110 Science Communication, BSC 2010 – Biology I, BSC 2011-Biology II, PCB 4674 – Organic Evolution Completion of examination questions, lab exercises, and homework assignments | Bio II: 90% of students will turn in reaction paper regarding biological conservation and receive at least an 80%. | >90% of students completed a total of 12 research homework assignments with a grade that exceeded 75%. Bio II: 95% of the students turned in the assignment and received over an 80%. | Bio II: will review appropriate topics for next class. |

| IV. Civic Engagement | | | | |
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| **Goals/Objectives** | **Means of Assessment/ Corroborating Evidence*** | **Criteria for Success** | **Findings** | **Plan for Use of Findings in 2013-14** |
| **Participate in group activities, community outreach** | BSC XXX – Biology Internship, active membership in Computational Biology Club, USFSP Student Chapter of the Botanical Society of America, Premed Club or other Biology student organizations | 50% of Biology majors either complete an internship project, or participate in a formal Biology student organization | This is unrealistic to expect at this point in the early stages of the program. | Readdress a more realistic goal, means of assessment and criteria for success for 2013-14. |
| **V. Multiculturalism / Diversity** | | | | |
| **Goals/Objectives** | **Means of Assessment/ Corroborating Evidence*** | **Criteria for Success** | **Findings** | **Plan for Use of Findings in 2013-14** |
| Promote and support diversity within the Biology Program through Biology courses. | BSC xxxx: Bioethics course | 80% of the students will lead a discussion related to diversity through a biological topic discussion paper that they present. | This was offered as a special topics course for the first time in spring. Enrollment was ~ 6 students – too low for collecting meaningful data. | Continue with same metric. We will be offering Senior Seminar in Biology as a capstone option, and this might be one of the themes for this course. |