THE UNIVERSITY OF NORTH CAROLINA AT ASHEVILLE
FACULTY SENATE

Senate Document Number 5916S
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Statement of Faculty Senate Action:

APC Document 49: **Revise the narrative introduction for Biology; Revise the requirements for the Biology major**

Effective Date: Fall 2016

1. Delete: On page 92, the narrative introduction for the Biology major:

> The major in Biology is designed to give students a substantial foundation in biology with an emphasis on investigative methods. The courses provide a broad background for students who seek awareness of the living world and their role in it, as well as training preparatory to professional schools, graduate schools, or science education careers. Graduates may go directly into careers in biology or related fields. They may also pursue advanced work in medicine, dentistry and veterinary medicine, or enter graduate programs in disciplines such as microbiology, genetics, molecular biology, physiology, evolutionary biology, ecology and conservation biology.
>
> Biology majors must complete one of three concentrations to earn the Bachelor of Science degree. Students who wish to enter health-related professions or graduate studies in molecular biology, cell biology, genetics, physiology or related disciplines should select the Cell and Molecular Biology concentration. Those who wish to pursue graduate studies in ecology, conservation biology, evolutionary biology or animal behavior should select the Ecology and Evolutionary Biology concentration. The General Biology concentration is designed for students seeking a more general education in the biological sciences and for students who do not have immediate plans to enter graduate or professional schools. Students seeking teacher licensure must fulfill all requirements listed under this concentration.

Add: On page 92, in place of deleted entry:

> The Department of Biology offers a Bachelor of Science degree that provides students with a diverse and rigorous interdisciplinary education for students who seek awareness of the living world and their role in it. The curriculum includes broad training across the major subfields of Biology, a strong foundation in investigative methods, and the opportunity to tailor upper-level coursework to the interests of each student. The program enables students to directly enter careers in biology or related fields, and prepares students to enter graduate programs in biology or related disciplines, as well as health and medical related fields.

2. Delete: On pages 92-93, the entry for the Biology major requirements and concentrations:

> **Requirements for All Biology Majors**
>
> I. Required courses in the major—18–19 hours including: BIOL 115, 116, 210, 211; either 480 or 498.
> II. Required courses outside the major—16–19 hours including: CHEM 111, 132 (or placement), 145, 231 and 236; MATH 191; STAT 185.

III. Other departmental requirements—Completion of requirements in one of the concentrations listed below. Major and oral competencies are satisfied by completion of BIOL 480 or 498 with a grade of C or higher.

Concentration in Cell and Molecular Biology

30–33 hours, including PHYS 131, 231; two courses from BIOL 344, 423, 443, 444; one course from BIOL 338, 339, 345, or 455; two additional 300-400 level BIOL electives; CHEM 222 and 232.

Concentration in Ecology and Evolutionary Biology

30–33 hours, including PHYS 131, 231; BIOL 443; one course from either BIOL 338, 345, or 455; three courses from BIOL 320, 322, 331-336, 340, 350, 351, 356, 357, 360, 365, 442 or ENVR 341, 343, 348, 360, 384; and either BIOL 444, or both CHEM 222 and 232.

Concentration in General Biology

18–20 hours, including five 300-400 level Biology courses, with at least one course from each of the following groups:

1. BIOL 344, 423, 443, 444
2. BIOL 338, 339, 345, 455
3. BIOL 322, 331-336, 340, 350, 351, 356, 360

Biology with Teacher Licensure

Students who wish to receive teacher licensure in 9–12 Biology must complete all requirements for one of the concentrations in Biology as well as PHYS 131 and the additional requirements indicated in the Education section of the catalog. Students completing the General Biology concentration for their major may use PHYS 131 as a substitute for one of the 300-400 level required Biology elective courses in the concentration. Students who wish to receive licensure in 9–12 Comprehensive Science must complete ENVR 105, 130, PHYS 131 and 231 in addition to the required courses for the Biology concentration and the required courses in Education. Students seeking middle school licensure should review requirements found in the Education section of the catalog and see the appropriate licensure advisor for additional information.

Add: On page 92, in place of deleted entries:

Major in Biology

I. Required core courses in the major—21 hours, including: BIOL 134, 135, 136, 210, 211; and 3 hours from 480 or 498.
II. Upper level electives in the major—18-20 hours, including completion of at least one class from each of the five areas below (a-e). At least three 4-credit hour laboratory classes must be taken. Classes that appear in more than one area may be used for only one category.
    a) Evolution: BIOL 331, 332, 333, 334, 335, 336, 351, 360, 365
    b) Genetics: BIOL 339, 423, 443, 444
    c) Integrative Biology: BIOL 320, 322, 333, 334, 335, 336, 338, 356, 357
    d) Research Techniques: BIOL 331, 332, 339, 340, 344, 345, 350, 351, 357, 442, 444
    e) Critical Thinking and Quantitative Analysis: BIOL 338, 344, 345, 350, 360, 365, 423, 442, 443
III. Required courses outside the major—19 hours including: CHEM 111, 132 145, 231, and either 232 or 233; PHYS 131; MATH 191.

IV. Other departmental requirements—Major, information literacy, oral, and written competencies are satisfied by completion of either BIOL 480 or 498, with a grade of C or higher.

Students are recommended to consult with their advisor for suggestions of additional coursework that will help them achieve their educational and career goals. Students who intend to enter graduate school in health-related professions or cell and molecular biology are recommended to complete at least 16 total hours in chemistry, including CHEM 222, 231 and 232, PHYS 231, and additional coursework in statistics, biochemistry and biology. Those who wish to pursue graduate studies in organismal biology, ecology, conservation, and related fields may seek additional coursework in environmental studies, chemistry, physics or statistics, as pertinent to their interests and goals.

Biology with Teacher Licensure

Students who wish to receive teacher licensure in 9–12 Biology must complete the requirements for the degree in Biology, as well as the additional requirements indicated in the Education section of the catalog. Students seeking middle school licensure should review requirements found in the Education section of the catalog and see the appropriate licensure advisor for additional information. Students who wish to receive licensure in 9–12 Comprehensive Science must complete ENVR 105, 130, PHYS 131 and 231 in addition to the required courses for the Biology concentration and the required courses in Education.

Impact: Total hours required for students to complete the Biology major will change from 55-71 to 58-60 hours with 39-41 within the major and 19 cognate courses in CHEM, PHYS and MATH. Our streamlined curriculum meets the 100hr credit cap on majors. Eliminating major concentrations will afford students normally enrolled in either Cell/Molecular or Ecology/Evolution concentrations greater opportunity for free elective coursework. Enrollment from Biology students in some cognate classes in CHEM and PHYS may be reduced. However, as a large proportion of Biology students will still need these classes for admission into graduate programs, we expect this reduction to be minor. The Biology students who now take these classes will be more motivated. Enrollment of Biology students in STAT 185 will be reduced. ENVR classes no longer provide credit for Biology majors and there may be fewer students taking courses in the Environmental Studies department.

Impact on departmental resources and space will be minimal because BIOL 134 will utilize the same/similar resources as BIOL 115 labs, although they will be spread over two semesters. Some adjustment of space utilization may be needed because BIOL 134 will be offered during Fall and Spring. There will be a shift in faculty workload. Dropping BIOL 115 lab in the Fall will free up faculty to teach BIOL 134 and may provide opportunities to teach across the curriculum in Humanities or in other general education courses.

Since BIOL 339 is no longer a requirement for pre-health majors, there may be a slight reduction in the number of students taking that course.

Rationale: We have retained, and added to, our strong core curriculum that teaches core principles, and develops breadth of knowledge, from molecular biology to ecosystem ecology, across the major taxa of organisms (plants and animals). However, we have eliminated the laboratory from our introductory Ecology and Evolution course (BIOL 115) and added an additional required 3 hour course, BIOL 134, Experimental Design, Analysis and Presentation. BIOL 134 will provide all majors with a consistent, comparable preparation in information techniques, including conducting research into primary literature, scientific writing including ethics, and experimental approaches including experimental design and data analysis (see Appendix for a draft outline of the course). Critical thinking will be an integral part of this course. The course will be required of all students in the major, including transfer students, and it will be a prerequisite for most courses above the 100-level. The benefit is at least two-fold. First, all Biology majors will have the same foundation and preparation for upper level courses, regardless of their experience prior to entering UNC Asheville (high school vs. transfer). Second, students will understand the importance of scientific methodology and information techniques that they will apply in their work in the department.

Our upper-level curriculum is being restructured around five core learning areas. Students will be required to take one class in each of the following areas:

1. Evolution -- Evolution is the unifying conceptual theme across all fields of biology. These classes engage in sophisticated exploration of evolutionary concepts and patterns, building on information that was introduced in BIO 115/135.
2. Genetics -- Genetics is essential to understanding all areas of biology, and an area of burgeoning research and rapidly accumulating knowledge. These courses build on information introduced in BIOL 116/136 and provide in-depth exploration of aspects of DNA structure, gene expression and regulation.
3. Integrative Biology -- These courses explore topics from an interdisciplinary perspective, both across biological disciplines and by integrating concepts from physics, chemistry, engineering, and/or social sciences, to understand biological systems. Integrative biology spans multiple levels of biological complexity, from molecules to ecosystems.
4. Techniques for Biological Research -- These classes build on BIOL 134 and emphasize modern laboratory and/or field techniques and skills for conducting research in biology. The practical skills that students gain in these classes will prepare them for future research opportunities and employment.
5. Quantitative and Critical Thinking -- These courses also build on BIOL 134 and include a strong focus on approaches to conducting research in biology and the critical interpretation of information. The classes emphasize experimental design, statistical analysis, critical interpretation of results and conclusions drawn from them, graphical presentation of results, and computer literacy.

This structure still provides students with a rigorous and broad experience in the Biological Sciences, develops a core of conceptual knowledge and scientific skills that are essential to student success, and allows students greater flexibility to tailor their curriculum based on their interests and goals. Although most of our classes involve several of these areas, the upper level courses in the department are listed in a maximum of two categories. This will help our instructors mindfully focus their teaching efforts on developing specific concepts, skills, and intellectual abilities. A comparison of the student distribution across these five learning areas with our current curriculum is provided in Table I of the Appendix.

To reduce the hours required to complete the major, we have eliminated the requirements for STAT 185 and PHYS 231 and recommend these courses for students interested in pursuing graduate programs. Students that would be in Ecology/Evolution and Cell/Molecular concentrations are required to take fewer courses in Chemistry. The catalogue provides recommendations for students whose interest and goals require different specialties in CHEM.

The structure of our curriculum around the five core learning areas makes it difficult to determine where ENVR courses fit within that structure. We have, at present, eliminated ENVR classes from this new curriculum. We hope to have significant conversations with Environmental Studies faculty to determine course overlap and the potential for cross listed courses and/or to determine how and which ENVR courses might satisfy credit for particular core learning areas for Biology majors.