From:	Redeker, Jean Marie
To:	Reed, Kathy
Cc:	Bichelmeyer, Barbara Anne; Orive, Maria E.; Colombo, John; Hefty, Scott; Mort, Mark E; Roberts, Jennifer A
Subject:	Request to Discontinuance BS in Biology
Date:	Wednesday, August 4, 2021 10:05:26 AM
Attachments:	BS in Biology Discontinuance.pdf Biology Program Review.pdf

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Kathy,

Attached is a request to discontinue the BS in Biology degree.

The request includes a rationale for the recommendation, a copy of the latest program review, and the projected impact on KU's mission, students, and faculty. Copied on this request are the Dean of CLAS, the associate dean of CLAS, and co-directors of the Undergraduate Biology program.

The degree meet the definition of an active academic program as outlined in USRR 8.1.1 and as such I understand this will considered by University Senate during the Fall 2021 semester.

All the best,
Jean

Jean M. Redeker, PhD | **Assistant Vice Provost for Academic Affairs**
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Recommendation for Discontinuance of an Active Academic Program

Name of Program and Type of Program: BS in Biology

Academic plan code to be retired: BIOLA-BS

Department: Undergraduate Biology Program

School/College: CLAS

CIP Code: 26.0101

Number of students currently enrolled (OAC): Spring 2021: 327

Number of students enrolled each Fall for the most current five year period: (OAC):

BS degree: Fall 2016: 242 Fall 2017: 466 Fall 2018: 509 Fall 2019: 555 Fall 2020: 403

Number of program graduates over the past five years (OAC):

BS degree: AY2016: 124 AY2017: 140 AY2018: 93 AY2019: 112 AY2020: 127

Rationale for recommendation:
The College of Liberal Arts & Sciences offered the BS in Biology degree with an emphasis in either Molecular, Cellular, and Developmental Biology or an emphasis in Ecology, Evolution, and Organismal Biology. In 2019, the Kansas Board of Regents approved CLAS' proposal to replace the BS in Biology with the BS in Molecular, Cellular, and Developmental Biology and the BS in Ecology, Evolution, and Organismal Biology. New students are enrolling in the new degree options approved by KBOR in 2019 and current students in the BS in Biology have the option to graduate or switch to one of the new degree options. The last admit term for the BS in Biology was Spring 2021.

Impact of discontinuance on students, faculty, staff, and mission:
None since KU continues to offer programs in in Molecular, Cellular, and Developmental Biology and in Ecology, Evolution, and Organismal Biology.

Signature and Sequence of Review:

Department or Unit: _____ **Date: 07//2021**

_____ **Date: 07/14/2021**

Dean, School/College: **Date: 08/03/2021**

Provost/EVC:_____ _ ___ **Date: 08/04/2021**

PROGRAM REVIEW SUBMITTED TO KANSAS BOARD OF REGENTS FEB 2019

UNDERGRADUATE BIOLOGY/HUMAN BIOLOGY PROGRAM REVIEW

Departmental Mission. The Undergraduate Biology Program (UB) helps KU fulfill its mission of educating leaders through its support of teaching efforts in the Department of Ecology & Evolutionary Biology (EEB) and the Department of Molecular Biosciences (MB). UB provides this support through laboratory courses, instructional support through funding undergraduate teaching assistants, academic advising of biology majors, class scheduling and enrollment management, and staffing the biology teaching resource center and computer lab. In addition, UB staff teach introductory biology, anatomy, microbiology, and physiology courses, capstone courses, and all of the major courses for the BS Molecular Biosciences and BAS Biotechnology degrees at the Edwards Campus. More than 4,570 students enrolled in 48 undergraduate biology lab courses with 331 separate lab sections during the 2016-17 academic year. Undergraduate Biology is tasked with administrative and curricular responsibilities of the Human Biology Program, which had 236 declared majors as of spring 2017, spread across five sub-plans: (1) Applied Behavioral Sciences, (2) Anthropology, (3) Biology, (4) Psychology, and (5) Speech-Language-Hearing. Human Biology was designed as an interdisciplinary academic major with a goal of understanding humans from a variety of academic viewpoints. Though intended to involve these departments, the interdisciplinary aspect is often lacking and students frequently choose only biology courses to complete their major requirements.

Faculty Productivity. (Undergraduate Biology and Human Biology are undergraduate programs only. Faculty productivity is addressed in the sections on Ecology & Evolutionary Biology and Molecular Biosciences.)

Student Learning and Curricular Changes. Faculty in EEB and MB, as well as UB staff, have been at the forefront of course redesign, particularly in large lecture, gateway biology courses. In 2013, EEB competed successfully for a postdoctoral teaching fellow who partnered with biology faculty across EEB, MB, and UB to redesign introductory courses. They developed a roadmap for assessing student learning across the biology curriculum that includes survey exams administered (1) as students enter the program, (2) after they complete the introductory biology sequence, and (3) while they are enrolled in their capstone course in their senior year. Data from these assessments are used to evaluate curricula and engage faculty in identifying changes where appropriate. Students pursuing an undergraduate biology degree at KU have several majors and sub-plans from which to choose; as of Spring 2017, there were 1,348 students pursuing one of 20 biology options. The two largest majors are the BS Biology and BA Human Biology.

Effectiveness of Degree and Program Demand. Considering the large number of biology majors and the breadth of major options, KU biology students are succeeding at high levels based on several metrics, including time to degree, graduation rates, number of biology majors who are University Scholars, number graduating from the KU Honors Program, and most impressively, the fact that biology majors comprised 34% of students graduating with Distinction (GPA in the top 10% of the College) or Highest Distinction (top 3%). Destination data compiled by the Career Center show 84-94% of biology graduates continued their education or are employed fulltime.

Faculty Service to the Discipline and University. (This is addressed in the sections on Ecology & Evolutionary Biology and Molecular Biosciences.)

Teaching Loads, Student Recruitment/Retention, Ideal Program Size, Mentoring. A significant amount of UB staff effort is directed toward supporting KU's biology laboratory courses. UB has direct or indirect teaching, staffing, equipment and supply, and preparatory responsibilities for labs that enrolled 94% of the 4,570 students enrolled in 48 biology lab courses. UB staff include four PhD-level lecturers/academic program associates, three PhD-level laboratory directors, and six laboratory coordinators. UB assists with recruitment efforts conducted by the Office of Admissions, and as part of this role, they meet with visiting prospective students to answer questions and explain the opportunities available to them as KU biology majors. The department also plays a major role with academic advising once the students are on campus. Biology has a team of faculty and teaching staff currently involved in KU's STEM Analytics project, which gives them access to institutional demographic data that allow them to investigate how their degree programs are serving students. The data analysis focuses, in part, on how well the department is retaining students, whether all students are being served successfully, and if retention patterns vary by particular groups. Currently, programs are too large for the faculty resources and infrastructure available, so the department is exploring ways to address those concerns. In regard to mentoring, undergraduate students in the College have access to several different academic and career advising resources: University Advising Center, KU Career Center, and UB, EEB, and MB advising and mentoring. In addition, UB maintains a comprehensive online database (kuub.ku.edu) of curriculum and advising resources, including academic plans that map out how every one of the biology degrees can be completed in four years. UB also advises and encourages students to pursue faculty-mentored research, and more than 300 participated during the 2016-17 academic year. UB maintains online research resources as well as monetarily supports undergraduate research efforts.

ECOLOGY AND EVOLUTIONARY BIOLOGY PROGRAM REVIEW

Departmental Mission. The Department of Ecology and Evolutionary Biology (EEB) at the University of Kansas represents a large and diverse unit within the College of Liberal Arts & Sciences (CLAS). EEB was established in 2000 through the consolidation of what were originally separate departments of Systematics and Ecology, Botany, and Entomology. The department's stated mission is "Exploring the History and Complexity of Life on Earth from Genes to Ecosystems; Educating Next Generation Scientists and Innovators in Biology," which fits well within the university's broader strategic planning mission to "lift students and society by educating leaders, building healthy communities, and making discoveries that change the world." The department works with its partners across campus to advance the national and international standing of EEB as a premier program for research and graduate training in the discipline.

Faculty Productivity. Tenure-track/tenured faculty members of the EEB are highly productive scholars. Over the review period, they published in 1,115 major peer-reviewed publications and 217 minor publications. Nineteen faculty authored books or monographs, and nine edited books/monographs. They presented 527 plenary or featured and invited talks and 595 other presentations at society meetings. Faculty members were awarded total extramural funding of more than $48 million. Total faculty research expenditures over the review period ranged from $4.8 million in 2010 to $3.2 million in 2015, with a range of expenditures per tenure-track/tenured faculty member in a given year of $76,858 to $117,319. The Division of Environmental Biology at the National Science Foundation has been the primary source of external support for research activities in the department.

Student Learning and Curricular Changes. EEB is organized into three major themes tied to the biology of organisms: Ecology and Global Change Biology, Evolutionary Mechanisms, and Biodiversity and Macroevolution. The department has an active graduate program of more than 65 doctoral and

Master's students taught and mentored by 38 tenured and tenure-track faculty with diverse interests and expertise. Annual evaluations of students and their faculty mentors by the Graduate Program Committee help ensure rigorous mentorship and student progress toward degree completion. Evaluations assess coursework, dissertation development, a timely and successful comprehensive exam, and scientific productivity measured in terms of field work and data collection, publications, grant proposals, and presentations at regional, national, and international meetings. This annual evaluation of students and mentoring has resulted in a median time to degree for doctoral students of just under five years. During the course of the review period, EEB graduate students published 394 peer-reviewed papers and presented their research 669 times. They secured research and travel funds from 61 extramural sources, including the National Science Foundation and the National Geographic Society. In addition, the students received numerous fellowships, including five NSF Graduate Research Fellowships and 12 University Fellowships. Two students have received university-wide outstanding doctoral dissertation awards. EEB partners with KU's Undergraduate Biology Program and the Department of Molecular Biosciences to offer a broad educational experience for students, preparing them for careers in scientific research, medical professions, conservation work, public safety, and more.

Effectiveness of Degree and Program Demand. The size of the department's graduate program has experienced only minor fluctuations during the review period of 2010-2016, staying between 62 and 70 students. Approximately 10 to 30% are Master's students, and about a third of the graduate students are international. About 5% are from underrepresented minorities. EEB has recently made efforts to increase the diversity of the student population through proactive recruiting. The median time to degree for the Master's is 2.7 years and 4.9 years for the doctorate, which reflects decreases due primarily to active mentoring and careful monitoring of student progress. The demand for graduates of the program is reflected in the career trajectories of recent graduates, which shows that the vast majority either continue their studies or work at a college or university. However, since the number of PhD's granted in EEB programs far exceeds the number of tenure-track positions available, many students choose not to pursue a job in academia, so the department provides a range of professional development opportunities. Examples include experience in coding, computation, and data analysis; museum studies; and public speaking, presentations, and community outreach.

Faculty Service to the Discipline and University. Service to the discipline includes EEB faculty in elected or appointed positions in professional societies and discipline-specific organizations, editorships, and memberships on editorial boards. They also serve on national funding agency panels. Almost all of the EEB faculty are active reviewers of manuscripts, collectively reviewing more than 350 manuscripts a year. Faculty are highly valued in leadership roles in numerous professional societies and organizations such as the Nature Conservancy Science Advisory Council and the Smithsonian National Museum of Natural History Advisory Board. They also hold leadership positions in key state and local agencies such as the Kansas Water Authority Administrative Council. In addition, EEB faculty provide extensive service to the university, serving on key standing committees, and to the College of Liberal Arts & Science and EEB's allied units (the Kansas Biological Survey, the Biodiversity Institute, and the Undergraduate Biology Program).

Teaching Loads, Student Recruitment/Retention, Ideal Program Size, Mentoring. The teaching responsibility of a 1.0 FTE faculty member in the department is the equivalent of one three-hour course per semester. Courses at the 500 level or above are expected to have at least six students enrolled and those numbered below 500 to have at least 12 students. For faculty with joint appointments, the teaching expectations are typically different, such as one three-hour EEB course per academic year. The department also expects its faculty to engage in mentoring at the undergraduate, graduate, and

postdoctoral levels. During the review period, faculty mentored a total of 426 undergraduates in research (mean of 11.2 per faculty member). Over the same period, faculty mentored a total of 252 graduate students (mean of 6.6 graduate students per faculty member as primary advisor) and a total of 84 postdoctoral researchers (mean of 2.2 per faculty member). Teaching does not include routine undergraduate advising or mentoring junior faculty, which is considered to be service. Graduate student recruitment is not without challenges, since many of the other top EEB programs are perceived to be in more desirable locations on the coasts. Therefore, the department expends considerable effort in recruitment, including visits to campus to give prospective students the opportunity to witness firsthand the interactive department, the dedication to graduate education, and the high quality of life enjoyed by students and the community. Faculty also recruit through interactions at conferences and by reaching out to colleagues at other institutions. University-wide fellowship and scholarship opportunities for incoming graduate students helps with recruitment efforts. Since the department guarantees five years of support to doctoral students and two years to Master's students, EEB limits the number of students to those that can be fully supported during the guaranteed period. Adoption of the guaranteed support policy 15 years ago has reduced the number of students in the program from approximately 95 to about 60 and significantly decreased their time to degree. Not only has the department been able to meet the funding guarantees for all students, it has also been able to provide partial support (using a combination of state, endowment, and grant funding as well as funds from the Biodiversity Institute and Kansas Biological Survey partners) for students during the summer months.

MOLECULAR BIOSCIENCES PROGRAM REVIEW

Departmental Mission. The undergraduate and graduate biology degrees offered at KU, including those offered primarily by faculty members in Molecular Biosciences (Biochemistry, Microbiology, and Molecular, Cellular, and Developmental Biology) play an enormous role in fulfilling KU's mission to "lift students and society by educating leaders, building healthy communities, and making discoveries that change the world." A large number of them go on to work in healthcare, including physicians, nurses, dentists, and virtually all other aspects of healthcare. Others work in biology-related industry positions and, through these companies, contribute to the discovery and development of medicines and devices that are central to human and animal health. The program's graduates also contribute to life-saving clinical research programs that have a direct effect on patients. For example, Carol Saunders is the Director of Laboratory Compliance, Test Interpretation, and Reporting for the Center for Pediatric Genomic Medicine at Children's Mercy Hospital in Kansas City, where she uses genomics to diagnose and treat disease in newborns. Other graduates go on to start businesses of their own based on biomedical discoveries made in the lab.

Faculty Productivity. The most relevant metrics for measuring MB faculty productivity are rates of publication and citations. During the three-year period measured for the departmental self-study, all faculty (with the exception of a few individuals nearing retirement) averaged at least one publication per year. The total departmental publication count for this period was 360, with an average of 11 publications per faculty member over the three-year period. During the four-year window reported for citations, publications authored by MB faculty members were cited 5,241 times, with individual faculty members averaging 154 citations per year. MB faculty members received a total of $9.4 million of federal grant funding during this period, with an average of $276,000 of federal funding per faculty member per year, primarily from the NIH. Faculty in the MB department represent a board set of sub-disciplines in biology, so there are a fairly wide range of expectations for publication rates, citation rates, and grant-funding levels. For example, in some fields the collection of data for publication requires long periods of waiting for organisms to develop, grow, and reproduce, while in other sub-disciplines, data generation is less dependent on the growth rates and caprice of biological experimental subjects so data

collection tends to be more rapid. Similarly, the amount of grant funding necessary to complete studies varies among the sub-disciplines represented by MB, with experiments involving mammals, other vertebrates, or cell culture tending to be the most expensive.

Student Learning and Curricular Changes. MB faculty are the primary contributors of courses in support of Human Biology and Biology. For the past five years, there have been roughly 1,300 biology majors. The learning goals and objectives for the MB program includes a comprehensive education in Biochemistry, Microbiology, and Molecular, Cellular, and Developmental Biology (MCDB). In addition to learning the fundamentals associated with these disciplines, students develop critical and analytical thinking, scientific reasoning, quantitative assessments, and laboratory research skills. They also gain an appreciation for current and future scientific challenges. Based on assessments of student learning, the curricular changes most likely to occur are these: (1) expand opportunities for experiential learning, including authentic research experiences; (2) continue to enhance active and engaged learning practices within the classroom; and (3) increase course and section offerings to enable lower student-to-faculty ratios and enhance the comprehension and efficacy of engaged learning practices. The Graduate Certificate Program in Chemical Biology was launched in the Fall of 2015 and saw its first two graduates in Spring 2017. This two-year program has grown from the original four departments (MB, Chemistry, Medicinal Chemistry, and Pharmaceutical Chemistry) to include students from six graduate programs, adding students from Pharmacology and Toxicology and Computational Biology. The program is showing more than anticipated growth, clearly adding strength to MB's own graduate curriculum, fostering communication and collaboration between departments at KU, and providing strong career development.

Effectiveness of Degree and Program Demand. With 800 of the approximately 1,300 biology majors in the last five years pursing MB degrees or a degree primarily supported by the department's faculty, the program has the most majors of any single program with the College of Liberal Arts & Sciences. Each year, approximately 280 degrees are awarded. Though the MB program is highly attractive and effective, there are several steps that are recommended to enhance enrollment and to allow for faster matriculation and higher graduation rates: (1) increase the number of faculty; (2) adapt the education infrastructure and enhance classroom spaces with active learning goals in mind and to update outdated facilities; (3) provide more direct exposure and involvement with KU recruiting/admissions to share information about types of research being performed and potential research opportunities; and (4) restructure UG Biology to enable MB to have more direct management of resources and communication to administration regarding goals, plans, and requisite resources. There is clear demand for the type of PhD graduates that MB produces; highly trained doctoral degree holders are needed in the biomedical workforce.

Faculty Service to the Discipline and University. MB faculty serve the discipline on editorial and advisory boards as well as by conducting manuscript, grant, and promotion and tenure reviews. Faculty also helped organize eight different scientific meetings. MB faculty serve on approximately 46 university committees, many of which are research-related; 13 CLAS committees; and about three departmental committees per faculty member. Faculty play important leadership roles in university-wide research programs, such as the Beckman Scholars Program, the Biotechnology Predoctoral Training Program, NIH-sponsored Centers of Biomedical Research Excellence (COBREs), and many others.

Teaching Loads, Student Recruitment/Retention, Ideal Program Size, Mentoring. Tenured/tenure-track faculty in MB have a significantly higher five-year weighted average SCH/FTE ratio than KU's AAU peers (17.5% more) but a lower average for Organized Sections per FTE (29.4% less). Based on the data,

it is likely that faculty in MB tend to teach fewer, but relatively larger, courses than AAU peers. Current workloads are focused on courses required for many biology degrees. Since highly qualified graduate students are the lifeblood of Research I universities, one of MB's top three goals for the future is to recruit more of them to Molecular Biosciences. Some of the current methods to cultivate a strong graduate student pool include updated department webpage and social media; faculty attendance at national meetings with particular focus on minority student enrollment; and applying for fellowships to facilitate excellent students' entry into the department without the need for them to serve as GTAs. With the current modest number of faculty, and the large number of majors, the department has little flexibility in the courses and sections offered, and faculty have limited space to explore innovative teaching approaches. Short of decreasing the number of majors and reducing course offerings—a situation that is not in the best interests of the department, the institution or the state—more faculty are required to expand and modernize our curriculum. For the PhD, the current program supports about two students per fulltime faculty; an ideal program size would be three students per faculty. About 26 faculty members are available for mentoring students, who upon entering the program are matched with faculty members for three nine-week research laboratory rotations. Upon completion of the rotations, students are matched with their Major Advisor, who helps to advise them in the selection of the best degree track to pursue.