

Kansas State University's Program Review Year 2019 Institutional Overview

The mission of Kansas State University (K-State) is to foster excellence in teaching, research and service that develop a highly skilled and educated citizenry necessary to advancing the well-being of Kansas, the nation and the international community. The university embraces diversity, encourages engagement and is committed to the discovery of knowledge, the education of undergraduate and graduate students, and improvement in the quality of life and standard of living of those we serve.

Review of selected degree programs each year helps assure that the university continues to offer rigorous and relevant curricula to meet the needs of students, faculty, the state of Kansas, and the Kansas Board of Regents (KBOR). Such reviews also ensure that the institution is heeding to its mission and strategic goals. For the 2018 cycle, K-State reviewed a total of 19 degree programs in the following disciplinary areas:

- **College of Agriculture** –Agricultural Technology Management; Horticulture and Natural Resources; Wildlife and Outdoor Enterprise Management; Park Management and Conservation.
- **College of Engineering** – Computer Science; Software Engineering; Biological and Agricultural Engineering; Architectural Engineering; Chemical Engineering; Civil Engineering; Computer Engineering; Electrical and Computer Engineering; Mechanical Engineering; Nuclear Engineering; Industrial Engineering; Operations Research; Construction Science and Management; Engineering Management.
- **College of Veterinary Medicine** – Veterinary Medicine.

What follows provides significant highlights of each program and proposed recommendations for the degree programs that did not meet the minimum criteria.

DESCRIPTION OF THE REVIEW PROCESS

The process began with each program examining its assessment of student learning. The Office of Assessment reviewed all reports with the Graduate School Assessment and Review committee additionally reviewing graduate programs' reports on the assessment of student learning. Reviewers provided feedback and recommendations for improvement. Each program examined the statistical data and drafted a summary report resulting from their program's self-review including information on: (1) Centrality of the program to fulfilling the mission and the role of the institution; (2) The quality of the program as assessed by the strengths, productivity, and qualifications of the faculty; (3) The quality of the program as assessed by its curriculum and impact on students; (4) Demonstrated student need and employer demand for the program; (5) The service the program provides to the discipline, the university, and beyond; and (6) The program's cost-effectiveness. In consultation with the College Dean's Office and/or the respective College or Program Committee on Planning, each department finalized the Program Review Report for its academic programs (by CIP code) as required by KBOR. The college dean then forwarded the reports to the Office of Assessment for review and comment. If necessary, the Office of Assessment returned the reports with suggested revisions to the college dean, which were returned with revisions for final approval. Summaries for all programs are attached. Where possible, the reports for degree programs within a given department were combined into a singular narrative, which may have resulted in slightly longer than the required two pages.

SUMMARY OF THE PROGRAMS REVIEWED

Of the 19 degree programs reviewed, ten include doctorates, thirteen include masters, and fourteen include bachelor's degrees. The degree programs are in strong and viable academic disciplines. Each department and its academic programs provide opportunities for the advancement of education, research, and service for the state of Kansas, the nation, and the world.

Horticulture and Natural Resources: Bachelor, Masters, Doctorate – CIP Code – 01.1103

Wildlife and Outdoor Enterprise Management: Bachelor – CIP Code – 03.0201

Park Management and Conservation: Bachelor – CIP Code – 31.0301

Reviews for these are postponed for one year.

Computer Science: Bachelor, Masters, Doctorate – CIP Code 11.0101

Major achievements or accomplishments since the last review includes the addition of pre-professional training to ensure students are properly prepared for advanced coursework. Number of graduates have increased by 134% from 35 to

82 in the past four years. Major challenges have resulted from increased enrollment of 397 to 558 from Fall 2014 to Fall 2016. Combined with budget cuts, the program is proposing two Options for the B.S. Degree: Entrepreneurial Computer Science to train students in various entrepreneurial activities and Cybersecurity to focus students on various aspects of security in computing systems. Another options is developing the Computational Core Program to extend CS education to other degree programs as well as other Kansas community colleges, high schools, and industry via state-of-the-art technologies with the intent of being self-sustaining from tuition/fees generated and to build stronger undergraduate and graduate education ties with the College of Business. With the growth in both undergraduate and PhD enrollment, faculty have been stretched to meet the student needs requiring increased faculty to match any future improvement goals.

Architectural Engineering and Construction Science and Management: Bachelor, Masters in Architectural Engineering - CIP Code 140401 & Bachelor in Construction Science and Management - CIP Code 151001

The department has played a crucial role related to the College of Engineering meeting and exceeding the State of Kansas UEIA goals for engineering graduates. High quality graduates are in high demand by industry, with approximately 50% of ARE graduates accepting jobs in the Kansas City, Topeka, Lawrence and Wichita areas for fiscal year 2018. Three years ago, the ARE curriculum was modified from a 5-yr 158 credit hour degree to 4-yr 128 credit hour BS degree. The first graduates of the 4-yr degree program will be in May 2019. The CNSM curriculum was modified in fall 2014 and the degree requirements were shifted from 130 to 124 credit hours. The major challenge is a lack of space, specifically needing a larger classroom that can seat up to 72 students. A large classroom that has the ability to accommodate presentations and active learning are required for high quality instruction. The department also faces challenges in hiring new faculty because of salary ranges. Faculty come from industry with an average of 17-year experience before entering academia making it difficult to offer comparable salaries. The immediate goals of the department are to gain additional space, construct new spaces, upgrade technology in the classroom, refurbish existing spaces and develop endowment funds to supplement faculty salaries. The major achievements of the MS Program in architectural engineering are reflected in the high level of professional success and job placement in industry attained by its graduates. One challenge in the area of ARE master's program is the lack of graduate faculty with a structural expertise - 70% of the ARE graduate students are structural emphasis while 27% of the graduate faculty have structural engineering expertise. Another challenge is the lack of space provided to the graduate students to work. The last challenge is funding of the graduate students because no funding currently exists.

Chemical Engineering: Bachelor, Masters, Doctorate – CIP Code – 14.0701

Five new faculty have joined the department with expertise in biological applications of chemical engineering, replacing faculty who left or retired. In the past five years, 19 PhDs have been conferred reflecting a high research output. The physical space of the department has increased by 30% to accommodate growing student numbers and increased research activities. A challenge faced in the past five years were increasing enrollments requiring larger classes or more sections in a time the number of faculty remained static. For example, the chemical engineering laboratories can only accommodate around 18 students at a time requiring more sections so that all students can take the laboratory classes when they need them. Upgrading the undergraduate laboratories are planned with renovations that would modernize the equipment, improve laboratory safety, and provide the students with experience with different types of equipment. To meet future improvement goals, the number of faculty in chemical engineering needs to be increased to improve its national ranking, thus helping support K-State's 2025 initiative. The department will also need to expand its grad student recruiting efforts to ensure that we have a large, highly qualified pool of applicants as well as expand online course offerings, an important source of revenue.

Civil Engineering: Bachelor, Masters, Doctorate – CIP Code – 14.0801

Since the last review the number of doctoral students has reached an all-time high of 32 and a record number of B.S. and Ph.D. degrees have been awarded. Two curricular changes were implemented enhancing the quality of graduates: a second senior design project laboratory was added to accommodate increased enrollment and a modified grade policy requiring a C or better in all engineering courses applied to the CE degree program and all prerequisites was instituted prior to taking subsequent program courses. In addition, a minimum GPA of 2.3 as a threshold for current students in other engineering programs was implemented for those intending to transfer to the CE program. The program is reaccredited through AY 2023. Despite these improvements and accomplishments, the program faces significant challenges in the form of resource needs. The department is joining with the Biological and Agricultural Engineering program to start a new Environmental Engineering undergraduate degree program. In order to accommodate this growth additional faculty/staff and laboratory space are needed. Maintenance and upgrade of laboratory equipment has been a

major challenge. The departmental K-State 2025 plans call for efforts to equip graduates for post-graduation professional career. Although the goal of increasing PhD enrollment has been achieved, graduating six PhD students per year has not been met on a regular basis. One of the major issues is the impending loss of additional instructional support due to the ending of the University Engineering Initiative Act (UEIA).

Electrical and Computer Engineering: Bachelor, Masters, Doctorate – CIP Code – 14.1001

Major achievements or accomplishments from the last review includes a new biomedical engineering program with over 40 students in the Fall 2018 inaugural class. Faculty research accomplishments are at the highest level in over 10 years, with over \$2.9M in expenditures reported in the latest year. The number of PhD graduates (5/year) and journal publications (60+ /year) produced per year over the past five years is at or near the top of the productivity in the College of Engineering. This is a major accomplishment, especially considering the teaching load of the faculty. Major challenges experienced in the past 3-5 years include unfilled faculty positions as retirements occurred amongst the university cuts. The department had 19 FTE tenure-track faculty (TTF) in 2008-09, and is now down to 17.1 FTE TTF. The ability to fund competitive startup packages for high-caliber faculty have been hindered with diminishing departmental funds. Facility renovations to accommodate the new BME program and new faculty research needs are becoming cost prohibitive. Improvement plans for the next 3-5 years are focused upon obtaining adequate funding support for the new BME program: 1) two faculty positions (one search in progress); 2) renovated teaching laboratory; and 3) appropriate research space. Then the department will propose graduate degrees (both M.S. and Ph.D.) in BME. These are essential for the retention of current faculty and future faculty recruitment. Then the program must secure long-term funding for GTAs, and methods to increase GTA funding as undergraduate enrollments increase.

Mechanical Engineering: Bachelor, Masters, Doctorate – CIP Code – 14.1901

The MNE Department has exceeded its UEIA goals and has increased PhD enrollment to 56. The number of endowed faculty positions has increased from one to nine. The MNE Department also has initiated exchange programs with Gujarat Technical University in India and the University of Leeds in the United Kingdom. The department is on a positive trajectory and is a leader within the College and the University. The program has experienced tremendous enrollment growth since the last Board of Regents review. In addition to the challenge of facility space, growth challenged faculty resources and time. Funding cuts from the State, increased focus on tuition dollars, and ending the University Engineering Initiative Act (UEIA) are upcoming challenges to overcome. Undergraduate enrollment has more than doubled since 1999 and PhD enrollment has doubled since 2013. Fortunately, the number of faculty has increased in recent years from 21 FTE in 2010 to 27.5 FTE currently (with an additional two positions to be filled next year), but the new Engineering building has provided very little new space available to the MNE Department.

Industrial Engineering: Bachelor, Masters, Doctorate – CIP Code – 14.3501

Three years ago the IMSE department collaborated with alumni to establish a voluntary mentor program that connects students with IMSE alumni providing the opportunity for students to learn from professionals in the field, gaining advice and mentoring in areas such as professional development, networking, career opportunities, interview skills, resume building, and more. This program currently involves more than 100 students. This Professional Academy also helped establish the IMSE Skill Xcelerator, a program that helps IE students identify their career aspirations, create a professional network and develop the skills needed to realize their goals. Major challenges experienced includes enrollments that have grown steadily for more than a decade. There were 114 majors in the department in Fall 2005 and 254 in Fall 2018. This enrollment growth has not been matched with a corresponding increase in faculty. The average class size during that time increased from 23 in FY 2005 to 67 in FY 2018. Consequently, faculty have less time available for research and individual advising. Industrial Engineering faculty salaries significantly lag industrial engineering faculty salaries in the region and across the nation. The gap is more pronounced at higher ranks and longer years of experience.

Agricultural Technology Management: Bachelor – CIP Code – 01.0201

Biological and Agricultural Engineering: Bachelor, Masters, Doctorate – CIP Code – 14.0301

During the evaluation period, the BAE graduate programs have had a steady growth. The average enrollment has increased from 31 (last review) to 36 (this review). For last review, the average numbers of M.S and Ph.D. degrees granted were 5 and 3, respectively. These numbers are 6 and 4, respectively, for this review. The quality of the programs and employer demands of our graduates remain high. The programs remain cost effective. Major achievements of the BAE since the last review includes developed a common core curriculum based on industry advisory board input and need to ensure uniform assessment of student learning outcomes across all three options. Curricular revisions increase

courses in biological sciences throughout the engineering curriculum through the development new courses to support the BSE program. The program also revised current courses to include professional practice and remodeled three laboratories that are used for teaching and research. Major challenges experienced in the past 3-5 years include implementation of the new biomedical engineering undergraduate program in the Department of Electrical and Computer Engineering, which has impacted the number of students in the BSE biological option. Higher than normal enrollments in the past two year affected upper level courses such as senior design and instrumentation. New and larger courses have created issues with classroom and laboratory facilities. Improvement plans for the next 3-5 years will begin with a review and update of the curriculum for all BSE options designed to strategically plan when courses are offered to optimize the student learning experience. The program plans to enhance recruitment and retention efforts to sustain the quality and increase enrollment of undergraduate students. The new degree will involve the development of an experiential Bio-Environmental Systems Teaching (BEST) Learning Center and offering of online courses. Along with the adjustments, the program plans to update their assessment plan to meet new ABET accreditation criteria. Recommendations to meet future improvement goals include improvement of laboratory and teaching facilities and incorporation of more experiential learning opportunities, acquisition of resources to support the needs of the program including graduate teaching assistants, and increase feedback from the Industry Advisory Council, and faculty.

Major achievements of the ATM program since the last review include reduction in the number of credits to 120 per KBOR guidelines and development of a laboratory facility for machinery systems. Major challenges experienced in the past 3-5 years include limited efforts on recruitment and retention in the ATM program with limited resources. Improvement plans for the next 3-5 years begins with updating the curriculum to include options (e.g., precision agriculture technology, water technology, bioprocess technology, production agricultural, and business and management; establishing sustainable recruitment and retention efforts with limited resources so to increase the number of students enrolled in the ATM program and associated courses. Recommendations to meet future improvement goals includes improvement of laboratory facilities, incorporation of more applied experiential learning opportunities, and attaining feedback from the Industry Advisory Council, and faculty.

Veterinary Medicine: Doctorate – CIP Code – 51.2401

In June of 2016, the College began a robust, transparent, and inclusive strategic planning process. In January of 2017, the new strategic plan for the 2017-2019 timeframe was published. This plan outlines six priority areas of focus. Specifically, these areas are: 1) Extraordinary Graduates, 2) Exceptional Teaching & Enhanced Learning, 3) Lower Cost of Education for DVM, 4) Responsive, Collaborative Research Enterprise, 5) Societal Impact through Service & Outreach, and 6) A Culture of Respect & Collegiality. The CVM is committed to supporting the long-term sustainability of the veterinary profession, addressing the student debt load, and supporting student well-being through aggressively identifying steps to reduce the aggregate cost of education for earning a DVM degree and increase the number and amount of student scholarships. Their strategic planning process identified a need for expanded clinical skills courses throughout all pre-clinical semesters. The new courses began in fall 2017 with a dedicated faculty member and RVT leading the efforts. In 2017 the CVM received continued full accreditation from the American Veterinary Medical Association. The Veterinary Medical Library (Trotter 4th floor) underwent extensive renovation and reopened in January 2015. A new Student Services Center (Trotter basement) was completed in August 2016, and provides offices and support rooms for the CVM Testing Center and CVM Counseling Services. An outdated lounge (basement) was renovated to house The Café, which opened in September 2016. The third floor of Trotter Hall has undergone a major renovation (13,587 sf) from May 2017 to January 2018. The gross anatomy laboratory, student cubicles, specimen storage, and locker rooms were deconstructed, and a new dedicated gross anatomy laboratory, high-technology medium-sized classroom (60 seats), student locker rooms, and student success center. Renovations to the first floor of Trotter Hall in 2018 included a second student success center and clinical skills laboratory (2,500 sf). In the near future, renovations to three areas in Mosier Hall will provide approximately 16,000 square feet of new space including the new Hill's Pet Health & Nutrition Center (3,400 sf) and a new research suite (~5,000 sf). Although the program received a \$5M base funding enhancement in 2013, the CVM remains one of the lowest state-supported CVMs in the U.S. They are increasingly reliant on non-resident students (62/112) to support the current funding model. First year resident tuition/fees are well below the national average (27th of 31 programs), however, non-resident tuition/fees hover near the national average (18th of 31). Clinical faculty recruitment is difficult due to private practice salaries and geographic location. Research faculty recruitment is difficult because of aging laboratory space and funding for competitive start-up packages.

RECOMMENDATIONS

Of the 19 programs reviewed, fifteen are recommended for continuance, one for enhancement, and three postponed until next year. This review identified four master's programs with low enrollments and/or few degrees conferred. Although Computer Science Masters fell below the Kansas Board of Regent's annual average minimum of 20 students enrolled and 5 degrees conferred, rationale for continuance is because the master's degree is largely a feeder program for the Ph.D., which far exceeds the minima. The rationale supporting the continuance of the Nuclear Engineering Masters is the national value of the program along with the overall departmental averages far exceeding the minima. Since Industrial Engineering Masters had one low enrollment year causing the 5-year average to be slightly below the minima, we suggest continuance of the program. The Software Engineering Masters program fell below the minima. This was mostly likely caused because external interest in the K-State MS in Software Engineering has changed in recent years with availability of reduced cost online programs offered from other U.S. colleges. The program is currently assessing if they can provide a more cost competitive program or phase out the current program to focus on the other degree programs, which have been growing. Three programs will be allowed a one-year delay for the BOR review because the department is in the middle of a major transition as described in the narrative. This postponement will provide the faculty and department the opportunity to focus on serving the students and completing the leadership transition. These programs are exceeding minima requirements for the BOR review.