

**Kansas State University**  
**Summary Assessment & Institutional Recommendations Reports**  
**CY 2016**

**Architecture: Master's – CIP Code – 04.0201**

**Architecture: Professional Master's – CIP Code – 04.0201**

***Mission, Centrality, Uniqueness.*** The Department of Architecture is a vibrant, nationally recognized design community educating students to become leading design professionals that effect positive change in the world. The Department pursues excellence in teaching, professional practice, research, and service to the citizens of Kansas and beyond; these activities are closely aligned with both the College's and the University's 2025 themes. The Department is an important unit within the College, accounting for the majority of its graduates each year, and contributing significantly to the College's vision for collaboration, scholarship and outreach. The Department provides diverse and exemplary courses for its own students, whose retention and job placement rates are consistently high, as well as many students outside the Department's programs. The scholarly and creative activities of its faculty are recognized at regional, national, and international levels. The Department is intensely involved in developing the facilities and infrastructure of not only the College and University but, through sustained outreach and the leadership of its graduates, the State of Kansas as well. The Department's programs are unique in its strong ties to the full range of design disciplines (landscape architecture, interior architecture, planning), mirroring relationships in practice. The Department's commitment to student understanding of architecture's roles in society is also distinctive: as a medium of expression, an integral, infrastructural component that helps forward the goals of society, and a complex built form that requires deep, systemic understanding for proper implementation. This holistic approach to the field ensures our programs are held in high esteem, and our graduates are aggressively recruited in the profession.

***Quality of the Faculty.*** The Department has a five-year average of 17 tenured, four tenure-track, and six term-appointed or adjunct faculty. Twenty-four are graduate faculty with five qualified to mentor doctoral students in the College's PhD in Environmental Design and Planning. All current faculty members have terminal degrees in architecture. Four have doctoral degrees. Seventeen are registered architects, contributing to the built environment and earning recognition for both visionary and built design. The full-time faculty is supplemented by practitioner-adjuncts including architects from BNIM and El Dorado, both highly regarded nationally and internationally, and the Victor L. Regnier visiting faculty chair. These, among other extensive linkages to the wider professional world that directly enhance the Department's teaching efforts.

The mainstay of the M. Arch program is the architectural studio, in which students synthesize their knowledge and ability into a design proposal. These courses routinely have low student to teacher ratios, as required by National Architectural Accreditation Board (NAAB), averaging 1:18 in the first two years, 1:16 in the third and fourth years, and 1:12 in the graduate studio year. Additionally, MS Arch students engage in an independent capstone or thesis project, working closely with individual faculty advisors for this portion of their studies. Tutelage at K-State's Manhattan campus is enriched by many external options, including study abroad at the College's institute in Orvieto, Italy, other study abroad programs, an eight-month academic internship, and the opportunity to engage in real-world community and urban design problems, including designing and constructing full-scale built work.

The Department, in cooperation with the College (CAP+D), stays current with architectural practice in terms of technological resources. Each M. Arch student in the department has dedicated space for

their design studio activities. MS Arch students have a carrel or studio space to pursue their studies and research.

The definition of scholarly activity within the discipline is relatively broad, including traditional scholarship, design and construction activity, architectural practice, and applied research. Faculty research and service activities are strong and sustained in these areas. Our faculty are seminal experts in their fields, particularly in environmental behavior and place-making, urban and sustainable design, building systems application, computer-aided design, and architectural pedagogy. Research projects are routinely subsidized by outside funding, and often include both graduate and undergraduate students as collaborators.

***Quality of Degree Programs:*** The M. Arch degree is very highly regarded. The *Design Intelligence* publishing group has ranked the program among the nation's top 20 professional programs seven times in the last nine years. The NAAB rigorously reviews professional architecture programs; in 2011 it gave the M. Arch full accreditation, citing five student performance criteria to have been met with distinction. The M. Arch is a limited entry program, requiring minimum GPA from freshmen students enrolled in the ENVD program and sophomores from UMKC. On average, 86 students apply to the M. Arch program each year, and 74 students are accepted (86%). Roughly 18 students from UMKC's 2-yr pre-professional program apply and roughly 12 are accepted into the 3<sup>rd</sup> year of the M. Arch (67%). The Department recently opened a new entry point into its program for applicants holding Bachelor degrees – the post-baccalaureate M Arch track. Requirements for admission to the post-bacc M Arch exceed Graduate School minimums, and include qualitative measures such as a portfolio and writing sample. In 2015, 28 students applied to the program, and 19 students were accepted (68%); seven began their studies. In 2016, 45 students applied, and 32 were recommended for admission (71%). Due to these efforts, enrollment in the M. Arch program is trending up, as are annual graduates. Retention and matriculation are also high; a four year average of graduates within six years is 85.5%.

The post-professional MS Arch is known throughout the country and the world as a venue for rigorous design-related research in three topical areas: Ecological and Sustainable Design, Environmental Behavior and Place Studies, and Design Theory. Globally recruited, students entering in the MS Arch are among the top students in their undergraduate programs, including five Fulbright scholars in the past eight years. MS Arch admission standards are high with a minimum 3.0 undergraduate GPA in the last 60 hours of undergraduate work, higher TOEFL scores than the Graduate School requirement, and a portfolio of work showing design and/or research competence that is rigorously examined during the admission process.

***External Demand.*** General demand for architectural graduates is high and is projected to rise over the next eight years, fueled by three trends: the ongoing retirement of baby boomers, a lack of mid-level architects due to outmigration during the 2000s, and overall projected industry growth in the US of 7.3% by 2022. Demand for Departmental graduates of both M. Arch and MS Arch programs is high and continues to increase. Indicative of this, over 70 firms recruited students in the College's 2016 Design Expo, a three-year high. Over the past four years, 91.4% of Departmental graduates were employed within six months of graduation, with another 3.6% pursuing higher education or other opportunities. Roughly 21% of graduates retain employment in Kansas. Missouri and Texas are the two other highest density locations for graduate placement (43% combined). An average of 36% of graduates work elsewhere in the US. Most graduates find careers with architectural design firms, with a small number each year employed in related construction industry fields or in civil service.

***Service Provided to the Discipline, the University and Beyond.*** The Department of Architecture furthers the university's mission by providing diverse and exemplary professional preparation and academic education for its students. In addition, the Department offers a large number of courses in

service of other departments, including nine courses for the IAPD program, four courses for the College's ENVD program, two courses for LARCP, and one course for Construction Science. The Department offers the College's largest open course, ARCH 301, averaging 250 non-major students per semester. Many of the Department's graduate level seminars are open to other College students and select departments outside the College. As graduate teaching assistants, MS Arch students contribute to the service courses the department administers to students from other programs in the College and the University as a whole.

The Department has adopted the University's land grant mission as its own, utilizing its expertise in outreach activities including directing three award-winning programs: the Kansas City Design Center, Design + Make, and the Small Town Studio. These activities combine teaching, research, and service initiatives in ways that help both urban and rural communities while promoting students' maturity as professionals and responsive civic leaders. The Department has been continually cited for strengths in the areas of construction methods and materials, analysis and planning, and interdisciplinary teamwork; faculty work closely with the profession and the construction industry to enhance knowledge in these areas. Through its nationally recognized expertise in energy conservation and sustainable architecture, the Department provides research and leadership for the profession and Kansas communities on improved building design strategies that are less reliant on fossil fuel technology. Faculty serve on state and national professional boards, offer continuing education, and help Kansas in disaster relief efforts. The academic work of MS Arch students and their advisors has contributed to the knowledge base of the profession through published theses, peer-reviewed articles, invited presentations at conferences, and original research and research application (particularly in ecological design, environmental behavior and place making).

***Cost Effectiveness.*** As a professional design-based program, the M. Arch program requires a number of small studio classes with high faculty contact hours to address the complexities of design and public welfare as well as meet accreditation requirements. The Department is cost effective despite its studio-based curriculum, achieved in part through large lecture courses that balance faculty to student ratios. In recent years, the M. Arch program's technology sequence has been streamlined through several curricular changes and course consolidations that have also improved students' course loads, enhanced conformance to prevailing educational standards, and increased teaching efficiency. Additionally, the department has increased summer course offerings and extended cooperation with the other departments in the college to create common interdisciplinary courses.

The MS Arch program is sustained with very little cost to the department. Administration of the MS program and the new post-bacc M. Arch program is overseen by one faculty member who also teaches a full load of courses. Departmental faculty hold MS Arch teaching and advisory roles in tandem with their M. Arch duties; architectural seminars, for example, which fulfill the largest number of credits for the MS Arch degree, are taught concurrently to MS Arch and M Arch students. MS Arch student work supplements and supports faculty research initiatives, grants, and scholarly work. MS Arch students, as advanced scholars, are the chief source of the Department's graduate assistants, helping to extend the capacity of full-time faculty.

## **Chemistry: Bachelor's, Master's and Doctorate – CIP Code – 40.0501**

***Mission, Centrality, Uniqueness.*** The Chemistry Department at Kansas State University has a long tradition of excellence in teaching, research and service. It provides extensive foundational classroom and laboratory instruction serving students in curricula across the University, and offers upper-level undergraduate courses serving students in the sciences and engineering. The mission of the Department of Chemistry is to create, accumulate and disseminate knowledge of use and benefit to the citizens of the State of Kansas, our country and the world. It does so through creative research activity, through quality instruction in classroom and laboratory courses, through training of undergraduate, graduate and postdoctoral scientists and educators, and through service to the profession, the University and the broader community.

Chemistry, chemicals and chemists are involved with every material object in our world, and therefore it is essential that an educated citizenry be familiar with at least rudimentary aspects of the discipline in order to understand the nature and consequences of their interactions, and to be able to make informed decisions.

The Department of Chemistry interacts productively through collaborative research with many units, including Agronomy, Biochemistry, Biology, Grain Science, Physics, Chemical Engineering, Veterinary Medicine, etc. The Ph.D. program is one of the two largest in the College of Arts and Sciences. Across the country, there are some 600 B.S. degree programs accredited by the American Chemical Society, there are 300 M.S. programs in Chemistry and nearly 200 Ph.D. programs in Chemistry.

***Quality of the Faculty.*** As of Fall 2016, the department is composed of 18 graduate faculty, 4 non-graduate teaching faculty, 6 technical support staff (instrumentation, glassblowing, electronics, X-ray, machinist, lab safety) and 3 accounting / clerical staff. Among our graduate faculty are winners of prestigious national awards including: three National Science Foundation CAREER Awards, three Alfred P. Sloan Fellowships, a Research Corporation Opportunity Award, a Camille Dreyfus Teacher-Scholar Award, and two discipline-wide junior faculty awards from the American Chemical Society. Our graduate and non-graduate faculty have also been honored for their teaching, mentoring and advising. We are regularly the recipient of National Science Foundation (NSF) Research Experiences for Undergraduate awards, which bring 10 students from under-represented groups to conduct summer research with our faculty members.

Our Graduate Faculty numbers make us one of the smallest departments in the 14-member Mid-American State Universities' Association (MASUA) group. Despite our small size, within the MASUA group our faculty rate highly in two objective categories: in extramural support per faculty member, and in publications per faculty member. Over the 5-year period of FY11 - FY 15, our total extramural support averaged \$2.377M (\$132,056 per graduate faculty member annually), and the graduate faculty published 365 manuscripts in refereed journals (an average of 4.3 publications per year per graduate faculty member).

***Quality of Degree Programs.*** In May 2015, following an in-depth external review, our B.S. Chemistry program was re-accredited for five years by the American Chemical Society's Committee on Professional Training. Their report specifically praised the quality of our students' senior thesis research reports. The number of Chemistry majors has grown steadily from 64 in FY 2010 to 112 in FY 2016. Most Chemistry majors enroll in our 1st-year Honors Chemistry 1&2 sequence, which requires a minimum ACT Composite score of 26, and which speaks to the quality of our entering majors. Since our last Regent's Review, four of our B.S. graduates have received the prestigious NSF Graduate Fellowship (and two others received Honorable Mention) and three received Goldwater Scholarships. Two other B.S. graduates were named a Fulbright Student Scholar and a Phi Kappa Phi

Fellow. We also offer a B.S. in Chemical Science as a sub-program: this degree requires less depth in chemistry while allowing for more breadth in allied areas.

In the period 2008 – 2016, 82 students received their Ph.D. and 22 students received their M.S. Although there is expected variability among the students in this program, only students of demonstrated excellence are allowed to graduate with the Ph.D. degree. The demographics of our graduate student body (and applicant pool) are shifting (still further) toward an increasing proportion of international students. We typically enroll 8-12 new students every Fall. The graduate program currently contains 63 students and has stayed close to this number for the past 10 years or so. The graduation rate is high at > 90% with the majority of students graduating with a Ph.D. Our Ph.D. degree is highly-regarded: in the most recent NRC survey of doctoral programs (2007), our program was ranked in the second quartile nationally. Our graduate students have received many campus and national awards. Six have received highly competitive NSF Graduate Fellowships. At least two students have received highly competitive NIH postdoctoral fellowships to continue their academic careers. In the past eight years, our students and faculty members have been awarded 18 U.S. and International Patents based on research conducted within our graduate program.

**External Demand.** The most recent data available (from FY 2015) revealed that 94% of our B.S. graduates were either employed (69%) or furthering their education (24%). Those employed have found positions in agrichemicals (e.g., Archer Daniels Midland), pharmaceuticals (e.g. Pfizer), or utilities (e.g., Wolf Creek Nuclear Power Plant). Those seeking further education have gone on to medical schools (e.g., Stanford, Kansas) or to graduate programs in Chemistry (e.g., Minnesota, Iowa, and Cambridge).

Chemistry degrees, both M.S. and Ph.D., are required for employment in a range of industries including the pharmaceutical, petrochemical, and agro-business. This includes industrial, academic and government positions located all over the country (indeed the World). Many chemists start in the research and development divisions but then advance to more administrative positions. The need for chemistry advanced degrees is most evident by the low (3% according to a recent ACS survey) unemployment rate for chemists holding advanced degrees. Our Ph.D. graduates have found wide success in industry (Intel, many at Haliburton, Samsung, etc.), in prestigious U.S. and foreign Universities (MIT, Johns Hopkins, labs of Nobel Prize Winners, University College London, etc.), and in government laboratories. Recent graduate students are faculty members at Illinois State and Texas State.

**Service Provided to the Discipline, the University and Beyond.** More than 90% of the 20,000 Student Credit Hours generated each year in Chemistry are taken by students outside our major. Our graduate faculty members have held numerous Invited Professorships at Universities throughout Europe and Asia, serve on Editorial and Advisory Boards of many scientific journals, review hundreds of manuscripts for publication in scholarly journals each year, and are routinely asked to serve on review panels for the National Science Foundation, Department of Energy, the National Institutes of Health, etc. Our teaching faculty and technical staff participate in a variety of professional development activities, e.g. : the American Chemical Society's National General Chemistry Examination Committee at the ACS National Meeting; the American Crystallographic Association's National Meeting and Bruker X-Ray User's Conference; the Kansas College Chemistry Teachers Conference; the Biennial Conference on Chemical Education; training to become a Certified Chemical Hygiene Officer; and the annual national and regional meetings of the American Scientific Glassblowers' Association. The department organized and hosted the Midwest Regional Meeting of the American Chemical Society in October 2016.

**Cost Effectiveness.** There are large costs associated with maintaining an excellent Chemistry program that include purchasing needed chemicals and supplies, the acquisition and upkeep of

sophisticated instrumentation, and the hiring of talented instructors capable of delivering quality instruction in the 230 undergraduate laboratory sections that we offer each academic year. The recent introduction of a modest per course fee in the College of Arts and Sciences has helped mitigate these costs somewhat. However, the returns on these expenditures are substantial as seen by our graduating students' success in finding gainful employment or admission to prestigious graduate and professional schools.

Despite being one of the smallest departments in the MASUA group, our department ranks near the top in Student Credit Hours (SCH) generated per faculty member. In FY 2015, Chemistry accounted for over 20,000 SCH, amounting to *ca.* 900 SCH / faculty member. As is true in all physical science disciplines, faculty startup costs are high (*ca.* \$450,000). However, much of these funds are expended for sophisticated permanent equipment which then benefits the entire department's research productivity.

## **Community Development: Master's – CIP Code – 04.0601**

***Mission Centrality and Uniqueness.*** The Department of Landscape Architecture and Regional & Community Planning (LARCP) program offers an online Master of Science in Community Development (MS CD) as a part of the Great Plains Interactive Distance Education Alliance (GPIDEA) collaborative program. The 2006 expansion of the MLA and MRCP degrees to include non-baccalaureate students and the 2008 addition of a MS CD solidified the program's capacity to serve the State and expanded our reach globally. All three degrees are regionally and nationally recognized.

The MS Community Development degree addresses challenges faced by communities in the United States and other countries, particularly those in rural areas. The MS CD degree builds the capacity of community leaders, practitioners and those working in all areas to help communities create an inclusive, sustainable future. The program was established in 2007.

***Quality of the Faculty.*** The MS in Community Development degree program faculty come from the five GPIDEA partner institutions including LARCP planning faculty, another K-State faculty from Family Studies and Human Services as well as other faculty experts in community development from multiple research institutions. This unique consortium avails students of the highest quality instruction in the field.

***Quality of Degree Programs.*** The Community Development program is geared toward students in related fields and practitioners wishing to augment their training to work most effectively in, or to advance beyond, their current position. As such, the students are highly motivated and bring a level of engagement to their studies difficult to replicate in on-campus settings. K-State and its LARCP department represent one of five universities that collectively comprise the MS CD annual average program enrollment of 57 and 17 degree recipients. During this review period K-State students and graduates have been one-third of the total MS CD program enrollment and degrees. Until recently, LARCP was a participant in this collaborative degree program but, due to faculty retirements, did not have the staff to teach or attend to significant numbers of students. In the last two years, a faculty member near tenure was appointed director and, with his leadership, K-State's share of students in the degree is growing as evidenced by the 11 degrees conferred in 2015. K-State Global Campus nominated the MS CD Program for the Association for Continuing Higher Education Exceptional Program Award, for Credit, at the regional and national levels. The program received the Great Plains regional award in 2016.

***External Demand.*** Because Community Development graduates serve virtually every sector of the economy and the majority of students are in employment related to the field while in school, employer demand is broad and consistent. Their salaries upon graduation are almost 20% higher than graduating Masters in Regional and Community Planning (MRCP) students, reflecting their mid-career status.

***Service Provided to the Discipline, the University and Beyond.*** Community development is also a service-based discipline. While the global distribution of students does not allow for collective service efforts, many students incorporate community-engaged projects into their coursework and capstone projects. A recent Community Development class worked with stakeholders to develop the program for a proposed Conflict Resolution Center in Manhattan, KS. Work done by the class

informed the design proposals prepared by landscape architecture and architecture students, demonstrating the important project planning and definition that planning professionals provide.

**Cost Effectiveness.** The Community Development program is taught both as overload and in-load. Some courses are taught simultaneously on-campus to MRCP students. The efficiency of this arrangement benefits the students and creates sustainable combined enrollment. Sharing teaching responsibilities with other institutions distributes the responsibilities while providing our department with compensation for teaching students from other institutions. The program has been successful in obtaining teaching responsibility for two large-enrollment core classes in the GPIDEA program, ensuring a regular stream of income to support the director's position.



## **Environmental Design and Planning: Doctorate – CIP Code – 04.0401**

***Mission Centrality and Uniqueness.*** The major academic objective of this doctoral program is to prepare professionals and researchers, who wish to teach at the graduate level, conduct research, engage in design, and or create policy for private and public institutions. Doctoral research will advance design and planning knowledge and procedures, including that which fosters a more livable and ecologically sustainable environment.

The PhD in Environmental Design & Planning is housed in the Dean's office of the College of Architecture Planning & Design. It draws faculty from the college's three departments and five disciplines (architecture, interior architecture and product design, and landscape architecture and community and regional planning). It offers four separate tracks (design, planning, sustainability and place making). It also requires students to take courses from multiple tracks in addition to those taken in their chosen track. The degree is unique in that it provides students with an overview of topics and research strategies in environmental design and planning, while undertaking a specific individual research project. It provides students with the ability to work in a variety of contexts.

***Quality of the Program.*** There are currently 11 professors certified to supervise students in the PhD in Environmental Design & Planning. Of these all are active scholars, six have substantial professional practice experience in their respective field, four hold, or have recently held, endowed teaching chairs, and four have received teaching awards. Collectively they have published 13 books and a plethora of chapters and articles. Although earned doctorates are not required to teach in the design disciplines, five hold this degree.

***Quality of Students.*** Between the fall of 2007 when the PhD in Environmental Design & Planning was first offered and the fall of 2013, 14 students were admitted. Of these 14 students, 7 have graduated. The time between the admission and graduation for these students was just over 3 ½ years. There are five students on campus and working to finish their dissertations. Two students are off campus pursuing other opportunities, and will complete their dissertations as time allows. Every one of the students was carefully screened at the time of admission. They each had to attain a score 1100 or better on the GRE. They all proved to be very good students.

***Employer Demand.*** Because of the breadth of offerings in the PhD in Environmental Design & Planning fields, and because of the nature of the students we accept, our graduates contribute to the environmental design and planning professions in a variety of ways. We offer four different tracks, which are tied to 5 different professional fields (as noted in item #1). Most of the students we accept have been educated in one of the professional disciplines. Not surprisingly, most graduates are employed in a circumstance that allows them to draw upon their professional education and to capitalize on the skills and understandings they gained as a doctoral student. Most have chosen to return to practice in either the public or private sector. Several have chosen to work in academia. Of our eight graduates we know that: one is working in a state government; two are working for private developers; and two are teaching in institutions of higher education

***Service Provided to the Discipline, the University and Beyond.*** The doctorate in Environmental Design & Planning is a small and highly individualized program, and the practical benefits that can and do flow from the program are largely the result of discoveries made through individual student research efforts. Some recent examples of research projects with potential practical benefit include: 1) a case study of somewhat troubled public/private development partnership that can provide guidance to both public and private partners in structuring future partnerships 2) a study of the influence of different types of urban farming operations on the price of surrounding real estate prices that can help to support arguments by policy makers in favor of urban farming, and to help them enhance the nature of urban farming operations, and 3) a study of the evolution of rural drainage patterns that

could provide land owners and communities guidance in managing land use and control soil erosion patterns.

***Cost Effectiveness.*** The doctorate in Environmental Design & Planning program costs very little. The most significant costs are: 1) administrative costs in the form of (one course) release time for the program chair, and 2) student support in the form of GTA or GRA positions. There are only two required courses in the curriculum. One is a course taught jointly by the PhD faculty, and placing PhD students strategically in an existing course offered for Masters students satisfies the other. In most cases faculty members are not compensated for their work in directing PhD students. Meanwhile, there are real benefits from the PhD program. Doctoral students contribute to the University through their role as GTAs, where they are able to augment our teaching capabilities and to their advisor through their assistance on research projects as a GRA. We try to support as many students as possible in an amount up to that provided by six semesters of 50% GTA support.

## **Geology: Bachelor's and Master's– CIP Code – 40.0601**

***Mission, Centrality, Uniqueness.*** Our mission is to deliver excellence in teaching, research and service so that our students (the workforce of tomorrow) are equipped with the knowledge to understand and predict how our planet works and to apply that knowledge to the key challenges facing society today: meeting demands for energy, minerals, water, and food, while responsibly managing our environment.

Kansas economy depends on the geologic resources of oil and gas, coal, building stone, sand, salt, gypsum, and water. As such, geoscience knowledge, expertise, and jobs underpin major sectors of the Kansas economy. In addition, over 3,000 non-major undergraduate students benefit from taking geology courses each year. These courses for non-majors are designed to contribute to better understanding of our planet and the geologic resources on which we all depend, as well as potential hazards of geologic nature. Ultimately, our goal in teaching content to non-majors is to make them better informed citizens of their community.

As a land grant university, Kansas State seeks to provide accessible education to the citizens of Kansas, including new developments in agricultural research and natural resources development and protection. Geology is critical to this mission by providing education and new knowledge about our planet Earth. The well-rounded, field-based nature of our undergraduate and graduate programs makes our graduates unique and sought-after by industry. To our knowledge, the Department of Geology is the only STEM department at K-State that requires its students to have a grounding in ALL four of the basic science areas: biology, chemistry, physics and geoscience, in addition to mathematics. The breadth and interdisciplinarity of this training prepares our graduates to be strong, flexible and ready for a variety of career paths, both within the geosciences and beyond.

***Quality of Faculty.*** Over the past eight years, the complement of tenured/tenure-track faculty has varied from 7 to 10 (plus 3 part-time instructional faculty). In spite of this period of rapid change, the department has grown and excelled in several areas. Geology faculty are expected to contribute in all areas of teaching, research, and service. A typical allocation of responsibilities is 40% teaching, 40% research, and 20% service. Average class sizes at the introductory geology level are around 110 students per class for a face-to-face format and 30 students per class for online courses. Upper division courses typically have between 5 and 20 students. Faculty members in the Department of Geology have won multiple external grants (which support graduate research assistantships, research, equipment, and travel) from the National Science Foundation, Department of Energy, NASA Kansas Space Grant Consortium, NASA, Environmental Protection Agency, and Kansas EPSCoR to name a few.

***Quality of the Degree Program.*** K-State Department of Geology has seen an increase in the number of undergraduate majors enrolled over the review period, rising from fewer than 50 in 2008 to 75 in 2015. However, new freshman enrollments account for only about 55% of the new undergraduate majors each year; the remainder are transfers from other majors during sophomore or even junior years. This is a commonly recognized pattern for recruitment of geoscience majors, typically attributed to the lack of geoscience education in K-12 (incoming students aren't aware of geoscience as a major). It demonstrates the importance to the department of maintaining excellent introductory geology courses as a means of recruiting new majors. Degrees awarded rose from 8 per year on average between 2008 and 2011 to 14 per year on average between 2012 and 2015, and available data indicate that the rate of undergraduate enrollment is equaling the rate of graduation. The average cumulative GPA for undergraduate Geology majors at graduation over this review period was 2.74 out of 4.0, rising from 2.59 in 2008 to 2.78 in 2015. ACT scores remained fairly steady at 24 over the review period.

K-State Department of Geology has seen a steady increase in the number of graduate students enrolled since 2007, rising from 10 students per year to 30 by 2015. We have also seen a corresponding increase in the number of MS degrees conferred, rising from 5 in 2007 to 25 in 2014. Since 2007, the average graduation rate for MS students has been 6.4 students per year. Enrollment standards have tightened over the past three years due to introduction of a more rigorous assessment rubric that considers scholastic aptitude, creative research potential and teaching experience. Average GRE scores of admitted students are beginning to reflect this change, with combined scores increasing from 293 to 303 between 2013 and 2015. A reflection of our strengthening criteria is the reduction in admission rates of 76% in 2014, 72% in 2015 and 61% in 2016 while the total number of graduate students enrolled has increased

Over the past three years, the number of presentations at national and international meetings and publications involving our undergraduate majors has averaged eight per year. Consistent with this increased engagement in research, our undergraduate students have also been increasingly successful in applying for research funding from both internal and external sources. Geology undergraduate students have also been recognized as KSU Chapman and Putnam Scholars and participated in the KSU Campus Internship Program.

Geology graduate students won numerous research grants, scholarships and awards over the review period, including Geological Society of America Student Research Grant, Society of Economic Geologists Student Research Grant, OUCRI Awards; and Ecology, Environmental and Earth Sciences-Emerging Researchers National Conference in STEM award; Engineering, Math, and Physical Sciences-K-State Student Research Forum award, KSU Campus Internship award, just to name a few. Six students received prestigious NSF fellowships through the GK-12 program.

**External Demand.** In spite of the recent downturn in the energy sector, jobs in the geosciences are expected to grow faster than average (10%) over the next 10 years, with median annual pay of nearly \$90,000. Areas of environmental science are predicted to grow even faster (11-12%). With the exception of mathematics/statistics, the predicted job growth in the geosciences exceeds that of nearly all other STEM fields—these are, at best, expected to grow at a rate similar to average job growth rate (7%).

The top three employers of B.S. degree-holding geoscience graduates nationally are the environmental services, oil & gas industry, and government; around 9% pursue a higher degree (M.S. or PhD). Although employers of M.S. degree-holding geoscience graduates nationally are dominated by the oil and gas industry (67% of graduates), for the first time since the American Geosciences Institute began its Geoscience Student Exit Survey, an industry other than oil and gas hired the most bachelor's graduates, i.e. the environmental sector. K-State Geology also has significant strengths in both the energy and environmental sectors, and we plan to develop these further to match anticipated areas of growth.

Employers of M.S. degree-holding geoscience graduates nationally are dominated by the oil and gas industry (67% of graduates), and K-State Geology has significant strengths in this area, as well. Our graduates are employed in professional geoscientist positions, many by companies that are global in scope. The list of employers for MS graduates are dominated by energy sector employers based in Houston and Denver, as well as small to medium-size companies across Kansas and Oklahoma. Other areas of geoscience, such as the environmental sector, are also growing rapidly, providing new employment opportunities beyond those traditionally associated with geology.

**Service provided to the discipline, the University and beyond.** Faculty members in the Department of Geology provide service to the University, to Kansas citizens, and to the profession. University-

focused service includes teaching a wide variety of courses, which many KSU students use to satisfy natural science degree requirements, as well as upper-division Geology courses that attract majors from other disciplines (e.g., engineering, agronomy, chemistry, geography, etc). Our faculty also supervise and mentor the research efforts of post-doctoral fellows, undergraduate and graduate students. They are involved in University-wide workshops (e.g., GROW), open houses, and promotional efforts via social media. Service to Kansas/USA citizens includes responding to inquiries from the public, serving on state committees (e.g., KGS Geological Mapping Committee), geological consulting, public presentations for educators and non-profit organizations, creation of educational resources focused on Earth history, K-12 outreach efforts (e.g., leading field trips, classroom visits, science fair participation), and participation in Boy Scout of America activities. Service to the profession includes professional organization leadership roles, leading professional field trips, organizing conferences and symposia both at KSU and also internationally, serving as peer-reviewers for journals, publishing companies, and funding agencies (e.g., the NSF, etc.), and judging student research at professional meetings. Of particular note is department organization of the 10th New World Luminescence Dating Workshop at K-State in 2015.

***Cost Effectiveness.*** The Department of Geology receives a General Use (GU) budget of \$933,000 (averaged over the review period) in support of its teaching and service mission, for which it delivers not only excellent B.S./B.A. and M.S. programs, but also nearly 12,000 student credit hours annually. This means that the Department of Geology delivers more credit hours per full time equivalent staff time (FTE) and per GU dollar invested by the university than any other STEM department at K-State—exceeding the means on these two parameters by nearly 50% and 70%, respectively. While the department is proud of its contribution to the university’s instructional mission, this teaching workload will need to be adjusted in the future for the department to continue to respond to the university’s 2025 goals, in particular, the need to obtain external funding, support graduate students, and engage in a greater proportion of scholarly activities. Over the past three years, for example, we were able to award scholarship funding of \$45,000 per year to our undergraduate students as a result of charitable donations from generous alumni and industry partners. The department has suffered from under-investment in terms of infrastructure, not only in terms of research-quality instrumentation, but also access to modern labs, classrooms and other facilities placing us at risk of falling behind peer institutions in the competition for the best graduate students and research funding. Recent equipment purchases funded through a combination of research grants, charitable donations, college funding opportunities, and department resources are significantly improving the research environment for our graduate students, as reflected in their increased involvement in high-quality publications and presentations.

## **Interior Architecture: Professional Master's – CIP Code – 04.0501**

***Mission Centrality and Uniqueness.*** The Master of Interior Architecture & Product Design (MIAPD) is housed in the Department of Interior Architecture & Product Design in the College of Architecture, Planning and Design. Its purpose as defined by its mission statement is to develop a community of learning with a comprehensive and vibrant approach to design and informed by multiple precepts: (1) the design of the interior has an integral and considered relationship to the building, landscape, and community that provide its context; (2) we design for an integrated user-centered whole comprised of varying scales from the interfaces and experiences intimately linked to the human touch points, to the interface between the human body and the near environment, to the design of places and spaces in the built and designed environment; (3) the act of “making” is integral to develop a process of understanding; (4) design inquiry through evidence and design research and analysis are crucial; (5) haptic experiences foster depth in consideration and design; (6) insights and opportunities are presented through richly investigated circumstances are fruitful; and, (7) learning from and sharing knowledge throughout society and across culture is imperative in addressing significant issues and the betterment of human life through the understanding of health, safety and welfare of occupants.

These varying scales are addressed through the multi-disciplinary ‘integrated’ tripartite approach of the curriculum. The Product Design portion of the curriculum relates to the aforementioned human touch points that typically take the form of small products or objects. The Furniture Design portion of the curriculum addresses how we commonly interface and occupy the larger interior environments. The furniture that we occupy must support both our physiological and ergonomic needs, as well as, live within and complement the larger interior environment. The largest realm that the curriculum addresses is that of Interior Architecture. It is concerned with the design and crafting of spaces to meet the functional and emotional needs of its users. Students learn to design in fluid scale shifts and appreciate the dynamics and details of all human spaces and things. Finally, the act of “making” is integral to develop a process of understanding; that design inquiry through evidence and design research and analysis are crucial in all three areas of the curriculum. There is no other degree in Kansas nor in the nation, that combines the integral aspects of interior architecture, furniture design, and product design, combined with the undergraduate and graduate level research and design synthesis as the MIAPD.

***Quality of the Faculty.*** The number of Interior Architecture & Product Design faculty totals 13, including the Department Head, who contributes to the Department’s teaching mission by offering one course per year. While the overall number of faculty in the Department has remained consistent, the number of full-time tenured, tenure-track, and instructional faculty has changed in proportions due to retirements, resignations and subsequent hires. During the past four years, these faculty have won over eight national or international awards for books, projects, or presentations. In addition, faculty have conducted four invited national/international exhibitions. Faculty are active in service and outreach activities including leadership in the profession on Boards of Directors for national and international organizations; service to the university through leadership on committees and task forces; and outreach to the state in service learning activities.

***Quality of the Degree Program.*** The program is regularly ranked by *Design Intelligence* in the top 10 in the nation (most recently as number 4, and the highest ranked program at a public university); and number 1 in the Midwest region. MIAPD graduate students are active and successful and in the past four years have garnered 18 research abstracts accepted at both EDRA (competing against educators and practitioners) and IDEC national and international conferences. MIAPD graduate students regularly compete in national furniture competitions and have been finalists and winners in these competitions.

The program attracts high achieving students from Kansas, Missouri, and other Midwestern states as well as from across the nation and enrollment is competitive. Enrollment trends have somewhat followed economic trends as we saw a dip in enrollment with the class entering the program's 2nd year in 2012. Enrollment has built back up from 14 to the more typical levels entering the program the last two years of 33. The amount of studio and workshop space available and faculty resources limit the number of students that can be accepted. With the development of the post-baccalaureate track to achieve the degree, we have included a mechanism to maintain strong enrollments, and have successfully offered summer courses to mitigate the bottleneck of space and equipment.

***External Demand.*** Because of the diverse nature of the education in IAPD, our graduates are very much in demand and able to be nimble in their career paths. Employers for MIAPD graduates are varied and include multi-national large architecture and engineering firms, architecture and design firms, interior design firms, design-build firms, to more specialized firms addressing the design of entertainment venues, residential projects, healthcare facilities, retail environments, pop-up environments, exhibits and theme parks, commercial furniture manufacturers, transportation firms (aircraft, airstream rehab), lighting design firms, and product design areas of firms such as Target and Nike. Firms employing MIAPD graduates are of a variety of sizes and structures, and are located across the nation (and globe). Through our Professional Advisory Board, frequent contact with practitioners in various areas of the country, internship feedback, and formalized assessment of graduates, the program faculty are made aware of perceived graduates' strengths and areas to build on for the future. As our society becomes increasingly complex, the need to address environments and the products and furniture as a comprehensive and interrelated manner within is imperative; with health, wellness, productivity, aesthetic and safety as primary concerns.

***Service Provided to the Discipline, the University and Beyond.*** Interior Architecture & Product Design faculty and students provide service to the disciplines and professions, the university, and the State of Kansas in many ways including traditional forms of serving on committees and task forces or strategic planning exercises; as well as through service learning opportunities where service to the community is included directly with student learning in coursework. Service projects include rehabilitation design projects for wounded warriors; prosthetic skins for amputees; exhibit design for the Kansas State Historical Museum; exhibit design for museums throughout the state; and many more. IAPD planned and hosted the 2014 Midwest IDEC conference; and hosted our 50th anniversary celebration during the spring of 2015.

***Cost Effectiveness.*** The Department of Interior Architecture & Product Design offers a total of 12 graduate-level courses in the required curriculum, of which students must complete 10 for a total of 31 required graduate credits. The overall five plus year curriculum resulting in the MIAPD is comprised of a total of 169 credit hours (31 graduate and 138 undergraduate). The typical apportionment of load in the department is 75% teaching, 15% research, scholarly and creative work, and 10% service/outreach. Faculty teaching loads/time include high contact hours averaging 18 per week due to the studio and workshop courses integral to the degree. Infrastructure required to produce the high quality degree MIAPD involves not only classrooms and studio/design laboratory spaces, but also fabrication areas including equipment and space for prototyping and mockups. Competing in an ever-changing technical world means providing digital technology (software and hardware) in addition to machines.

Course sizes are kept at a maximum of 16 students in a studio course section, 11 students in a workshop course section, and 36 students in a lecture-based course section. Of these, class sizes are appropriate to the subject, delivery, and safety of students.

**Landscape Architecture: Professional Master's – CIP Code – 04.0601**  
**Regional and Community Planning – Professional Master's – CIP Code – 040301**

***Mission Centrality and Uniqueness.*** The Department of Landscape Architecture and Regional & Community Planning program offers two accredited professional degree programs, a Master of Landscape Architecture (MLA) and a Master of Regional & Community Planning (MRCP), each providing highly-qualified and -regarded professionals to the State of Kansas for more than 50 years. A Minor in Community Planning complements the MRCP degree. In addition, the MRCP program offers an online Master of Science in Community Development (MS CD) as a part of the Great Plains Interactive Distance Education Alliance (GPIDEA) collaborative program. In step with the mission of our land grant institution, the department's three foci are critical inquiry and creative thinking, community engagement and environmental stewardship. The 2006 expansion of the MLA and MRCP degrees to include non-baccalaureate students and the 2008 addition of a MS CD solidified the program's capacity to serve the State and expanded our reach globally. All three degrees are regionally and nationally recognized.

The programs' synergistic relationship allows for effective shared responsibilities in departmental governance and external representation as well as cross-disciplinary course offerings. At the same time, each program meets discipline-specific accreditation standards and is staffed by discipline-specific faculty.

The MLA degree has been nationally ranked in the top eight every year that the *Design Intelligence* (the preeminent ranking of academic design programs) poll of landscape architecture practitioners has been conducted beginning in 2005. Practitioners most recently ranked Kansas State as sixth in the country and the highest in the Midwest. The 2006 transformation of the BLA degree to an eleven-semester non-baccalaureate track to the existing MLA degree was the first in the nation and is the only one in the top-ranked programs, reflecting the K-State landscape architecture program's long-standing national leadership in design education.

The MRCP professional degree is recognized by *Planetizen* (the only ranking of planning programs) as the sixth highest ranked program in the Midwest out of the sixteen programs in a twelve state region. It is the only Kansas planning program in the top ten. The program addresses the need for certified city planners to address contemporary city and regional planning issues.

***Quality of the Faculty.*** The landscape architecture degree program faculty are nationally award winning and highly recognized for their expertise across the spectrum of landscape architecture practice. During this review period, five have received awards from the Council of Educators in Landscape Architecture recognizing their teaching and/or research. Three have been honored with university teaching awards and one was recognized as one of the 25 most admired educators in the nation by *Design Intelligence*. Eight of the thirteen are licensed practitioners, four hold Ph.Ds. (relatively rare in landscape architecture programs) and two are Fellows of the American Society of Landscape Architects. Four faculty members have received Fellowships from the Landscape Architecture Foundation, a significant honor. Additional externally funded research is supported by agencies such as the NSF, USDA-NIFA, KDHE and the Sunflower Foundation. The faculty provide significant service to the profession with service on the Landscape Architecture Foundation Board, the Landscape Architecture Accreditation Board, the Council of Landscape Architectural Registration



Boards, the American Society of Landscape Architects and the Council of Educators in Landscape Architecture.

The seven RCP degree program faculty provide instruction for the MRCP and Community Planning Minor. Combined they embody the best in community and regional planning academic and professional practice experience. Among the faculty there is one Fellow of the American Institute of Certified Planners (AICP) and two members of AICP. A faculty member sits on the Executive Committee of the Kansas Chapter of the American Planning Association, ensuring close communication between our program and planning professionals.

***Quality of Degree Programs.*** The average response of our landscape architecture students to the *Design Intelligence* (DI) survey is that one hundred percent of the students responding believe they will be well prepared for their profession upon graduation and 90% or more indicate that they plan to take the Landscape Architect Registration exam. Both responses are significantly greater than that of students at other schools who have outranked K-State. Landscape architecture students' work is recognized regionally and nationally. Student projects annually receive awards in the Central States ASLA design competition. During this review period, landscape architecture students led multi-disciplinary teams to the top four finalists (2009) and \$50,000 first place prize (2013) in the international Gerald D. Hines Urban Land Institute student design competition. Landscape architecture students are regular participants in the K-State Research Forum and presenters at the national Council of Educators in Landscape Architecture meeting. The Landscape Architectural Accreditation Board (LAAB), accredited by the Council for Higher Education Accreditation, completed a re-accreditation review in Spring 2016, granting full re-accreditation to the program for another six years with no recommendations for improvement. The MLA program was first accredited by the LAAB in 1980 (the first year graduate program accreditation was available) and has been reviewed first every five and now every six years, maintaining full accreditation throughout. In addition to assessing how well the program meets its own specific and institutional educational mission and objectives, the boards evaluate the program against national standards ensuring the essential educational components leading to entry-level professional competence. The 2016 Site Visit Team found the program to be exemplary.

The Regional & Community Planning program attracts some of the top students in a college with competitive admissions. The addition of the non-baccalaureate track brought a new type of student to the program in the last four years, revitalizing the student body and creating a critical mass of students. The recent pass rate of MRCP graduates taking the American Institute of Certified Planners examination is 100%. This historic pass rate is the highest of master's programs in our region. A MRCP student won the 2012 New Horizon's Award from the Kansas Chapter of the American Planning Association and the Student Planning Association's Boxhattan project was recognized with the same award in 2011; a student poster was awarded first place in the K-State Research Forum in 2014; and MRCP students were the 2011 and 2014 recipients of the APDesign ARCC King Medal, all reflecting the high quality of student research and creative activity. The Planning Accreditation Board (PAB), also accredited by the Council for Higher Education Accreditation, completed a re-accreditation review in Spring 2015, granting full re-accreditation to the program for another seven years. The MRCP program was first accredited by the PAB in 1985, the first year accreditation was available, and has been reviewed every six years, maintaining full accreditation throughout. Like LAAB, PAB accreditation evaluates how well the program meets its own specific and institutional educational mission and objectives, the boards evaluate the program against national standards

ensuring the essential educational components leading to entry-level professional competence. Suggestions for improvement from the 2015 review were minimal and the board was highly complementary of the program's strategic planning efforts. The board now refers other programs to the K-State MRCP program for examples of best practices.

***External Demand.*** The landscape architecture graduates have been successful in obtaining employment in the field, despite the downturn in the economy. The graduates' 95% average employment rate over the last five years is the highest in the design professions, reflecting the national demand for landscape architects as well as the program's national reputation. Graduates are employed by internationally firms such as AECOM, EDSA and Sasaki as well as industry leaders in the central United States. Average starting salaries are the second highest in the college. The Bureau of Labor Statistics predicts that there will be an 18% shortfall in the supply of landscape architects during the next twenty years. The number of graduates from existing programs will meet the demand to replace retiring baby boomers but will not meet the growing demand from a citizenry that demands sustainable solutions to our world's growing population.

The city planning (the focus of the MRCP degree) was noted as one of the Fifty Best Careers between 2010 and 2013 by *U.S. News and World Report*. MRCP graduate employment rates reflect this demand with 92% of the students finding employment immediately upon graduation at the highest average starting salaries in our college. The rate of employment has increased from 85% just three years ago. Traditionally, MRCP graduates have been employed in the public sector as municipal and regional planners. While this continues, a growing number of students gain employment in private practice, expanding the impact of our graduates. In recent years, graduates have been employed as city planners across the central United States and in leading multi-disciplinary offices such as TranSystems, TetraTech and Delos.

***Service Provided to the Discipline, the University and Beyond.*** The landscape architecture students and faculty invest substantial time and energy to serving our discipline, university and community. The majority of this work is completed in conjunction with class assignments. A number of required courses specifically utilize community service as a learning vehicle. Most recently completed community-based projects include: Visions in the Ville, plans for the next 125 years of Aggieville in Manhattan, Kansas; Parcels and Peppers: Savory Ideas for Addressing Vacancy in St. Louis, working with the City of St. Louis and the White House Strong Cities, Strong Communities program, and design and construction of a Pop Up Park for the Wichita Downtown Development Corporation supported by the Knight Foundation. To celebrate the landscape architecture program's 50<sup>th</sup> anniversary, a special studio prepared plans to complement the 2025 Master Plan, providing analysis and design to inform daylighting Campus Creek on the K-State campus. The program hosted the 2015 Council of Educators in Landscape Architecture conference bringing over 300 educators to Manhattan from 15 countries. The event raised the visibility of K-State and enhanced our national reputation.

The regional and community planning, as a discipline, is service-based. Service learning is an integral part of the curriculum and students engage in preparation of housing studies, comprehensive plans and urban design studies as a part of their required coursework. Recent projects have included economic development proposals for Eureka, KS; community engagement in Jetmore, KS; and a park planning in Park City, KS. The Student Planning Association developed an award-winning outreach project, BOXHattan, which teaches children about the value of city planning. The event is a favorite at K-State Open House and Grandparent's University and the students present it to local 5<sup>th</sup> graders

every year. The program hosted the 2015 Spring Symposium for the Kansas Chapter of the American Planning Association, bringing planning professionals from across the state to learn from the K-State campus and our local community.

***Cost Effectiveness.*** The typical teaching load of the 14 FTE landscape architecture faculty is 13 contact hours per week with accompanying expectations for class preparation. The remainder of a faculty member's time is designated for research, scholarship and creative activity and academic, community and professional service. Studios meet the Landscape Architectural Accreditation Board expectations of 1:15 faculty student ratios. Landscape architecture faculty members provide two well-established large enrollment lecture classes that serve the university and college. Recent curriculum changes provide greater connections between landscape architecture and regional and community planning classes to enhance the department's overall efficiency while creating unique learning opportunities for students.

The Regional and Community Planning program has undergone revitalization during this review period, growing student numbers and credit hour production. The addition of non-baccalaureate students to the MRCP degree was achieved at no cost to the university or state. Planning Accreditation Board standards require a minimum number of faculty members, meaning that the faculty was in place to receive additional students. The combination of small graduate seminar classes for those in the major and large lecture classes serving a broader student population allows the relatively small number of faculty to work efficiently and effectively.

The departmental structure allows efficient support of three degree programs that work well together to serve five cohorts of students. In addition to sharing course offerings across programs, the department is structured to share faculty support in the most efficient and effective way. The department operates a budget system that encourages faculty development of external support and their personal management of the funds with staff oversight. Funds provided to faculty in support of research, scholarship and creative activity come with an expectation that they are leveraged by external support. As a result, virtually every faculty expenditure of departmental research, scholarship and creative activity (RSCA) support is matched by external funding, university grant programs and/or the Dean's support. During the last two years MLA and MRCP students have shared workspace. In addition to creating new opportunities for interaction and collaboration, the arrangement created an efficient work environment. With attention to outreach and advertising, the department has increased credit hours delivered to students outside of the department from 15% of the total in FY 2008 to 27% in FY 2015. Credit hour production is further augmented by the LARCP faculty's leadership role in the college Ph.D. program. Ninety percent of the Ph.D. students are supervised by LARCP faculty.

## **Mathematics: Bachelor's, Master's and Doctorate – CIP Code – 27.0101**

***Mission, Centrality, Uniqueness.*** The mission of the Department of Mathematics through all its degree programs is to prepare students for careers in teaching and research, as well as for a variety of technical and administrative positions in industry and government in Kansas, the United States, and abroad. The research in the department advances mathematical knowledge worldwide. The undergraduate, graduate, and postdoctoral programs are an inseparable part of the research activities of our faculty; these research activities are a key component in the mission of the University.

While all Regents schools offer a degree in mathematics, our department is particularly distinguished by the strength of our undergraduate research programs, overseen through our Center for the Integration of Undergraduate, Graduate, and Postdoctoral Research.

***Quality of the Faculty.*** Teaching evaluations are conducted in all classes. Evaluations in classes vary with the level of the class, with students satisfied in lower-level service courses and giving higher ratings in upper-level classes. Exit interviews praise the willingness of faculty to answer questions and work with students.

The department produces 40-50 scholarly papers a year and will generate about \$1.5 million in extramural funding during the current year. The department awards about \$5,000–\$10,000 in graduate scholarships each year. Almost all students receive teaching assistantships. The department's M-Center has international collaboration agreements with SwissMAP and IHES.

Faculty and graduate students associated with the Center for Quantitative Education (the Q-Center) annually offer summer workshops for Kansas teachers in collaboration with the College of Education. Faculty regularly work as editors and referees for professional journals and for funding agencies. The department runs an acclaimed Math Circle for elementary and middle-school children.

***Quality of Degree Programs.*** There are no special admission requirements for math undergraduate majors. However, the program attracts many of the best students at K-State. The average ACT score for math majors is 29.3. The mathematics undergraduate degree is purposefully flexible so students can pursue a wide range of options. While we do not offer official tracks, the department offers recommended curricula for Applied Mathematics, Actuarial Mathematics, Pre-Graduate Studies, and Mathematics Education. It is difficult to determine a graduation rate for our Bachelor's degrees, since students change majors freely. We have a large number of students who transfer to other departments, and another large number of students who transfer in from other departments.

Admission to the graduate program is based on the strength of the undergraduate mathematics background, recommendation letters, a statement of purpose reflecting a high level of mathematical awareness and personal maturity, research interests matching those of KSU faculty, GRE scores (including verbal), and undergraduate GPA. Admitted students typically have GRE scores at or above the 85th percentile in quantitative and verbal and undergraduate grade point averages would be over 3.6. Most admitted students have participated in summer research programs and many have presented posters at large mathematics meetings. Budget concerns have restricted the number of admission offers allowed. The department has research groups in Analysis, Algebra, Topology and Geometry, Applied Mathematics, Number Theory, and Mathematics Education. An individual student's research might fall under several of these categories.

The department underwent an external review by two leading mathematicians from other institutions in May 2014. These reviewers recommended an overhaul of the graduate program involving three components: a revision of the qualifying exam system, enhanced recruiting efforts, and a reduction in teaching load. The first two items have been accomplished.

**External Demand.** Over 70% of undergraduate majors go on to either high tech careers or graduate study. Math undergraduate majors find work in many different industries, including Insurance, Aerospace, Technology, Biomedicine, Natural Resources, Research Laboratories, Education, and the Military. Titles of our graduates include Actuary, Market Analyst, Software Engineer, Biostatistician, Lawyer, Assistant Professor, and Lieutenant. Graduates of the past seven years were employed in over a dozen states with about half staying in Kansas while the others find work from coast (New Jersey, North Carolina) to coast (California, Oregon, Washington, Alaska).

The M.S. program prepares students for careers with community colleges, actuarial firms, software companies, financial consultants, governmental offices, and many other types of employers. The Ph.D. program prepares students for employment (at a higher level) with these same types of organizations, as well as at universities. Examples of placement of recent Ph.D. graduates include a postdoctoral position at SUNY-Buffalo, a teaching position at the College of San Mateo, a tenure-track position at Cal State Sacramento, and a software development position at the IBM Company Aspera (founded by K-State graduate Michelle Munson).

**Service Provided to the Discipline, the University, and Beyond.** The math department is committed to general education, with most students satisfying the requirement for a course in “Empirical and Quantitative Reasoning” with a course in mathematics. The Department hosts three centers, the Mirror Symmetry & Tropical Geometry Research Center (the M-Center), the Center for the Integration of Undergraduate, Graduate, and Postdoctoral Research (the I-Center), and the Center for Quantitative Education (the Q-Center). The Department of Mathematics generates more student credit hours than any other department on campus due to our exceptional load of service courses. Almost all these classes are taught with a faculty member giving two large lectures a week and the GTAs in our M.S. and Ph.D. programs teaching smaller recitation sections twice a week. The Q-Center regularly offers summer workshops for teachers.

**Cost Effectiveness.** The primary cost for the program is in faculty time, as math doesn’t require expensive labs. It is very difficult to separate costs for the major from general costs, since essentially all classes we offer for majors have large numbers of students from other programs. Even the advanced courses are often taken by Engineers or Education majors needing technical electives. The department provides courses taken by every major on campus. In particular, the growth desired by the engineering initiative requires extensive support from the mathematics department. An engineering student who is unable to take Calculus 1 in their first semester can’t finish in 4 years which means more sections are added). Overall, the department produced over 26,000 student credit hours last year, more than any other department at K-State.

## **Physics: Bachelor's, Master's and Doctorate – CIP Code – 40.0801**

***Mission, Centrality, Uniqueness.*** The Department of Physics at Kansas State University has a broad commitment to generate and disseminate knowledge. These roles are interrelated and complement each other. The Department has the responsibility to maintain an active research program in order to contribute to society through the generation of a better understanding of the physical world and our relationship to that world. Such a research program assures the University a faculty that is intellectually creative and productive and an undergraduate and graduate curriculum that is current.

A strong effort has been made to involve undergraduates in research. In our Department there is no conflict between research and teaching; our best researchers are our best teachers. Our areas of graduate research are Atomic, Molecular, and Optical Physics (top dozen or so programs in the country); Condensed, Soft Matter and Biological Physics (unique area of research in the US); High Energy Physics; Cosmology; and Physics Education (one of the top and one of the oldest programs in the world). Faculty receive competitive federal funding in all these areas and are leaders in their field as evidenced by invited talks (39 last year) given at international conferences.

***Quality of the Faculty.*** The Department of Physics at Kansas State University is built around 30 highly productive faculty members whose research expertise here at K-State and world-class facilities such as Fermi National Lab, CERN, DESY (German Electron Synchrotron), SLAC National Accelerator Laboratory, and Lawrence Berkeley National Lab provide students a wide variety of research experiences. The high quality of our program is reflected in many special awards and recognitions received. It is also reflected in the highly competitive external funding received by the department. With only 30 permanent faculty members, we receive competitive external funding of about \$8 million each year. Among our peer institutions, only North Carolina State receives more federal grant funding although it should be noted that their faculty numbers are considerably larger than ours. Noteworthy grants are the Department of Energy (DOE) umbrella grant for the Macdonald lab and the DOE umbrella grant for the High energy physics group.

We have paid close attention to research in physics education being conducted throughout the nation to make sure that our teaching program for students is cutting edge. Our own Physics Education research group has contributed to many areas of this research and is an acknowledged leader internationally in this area; thus, keeping the department apprised of relevant work. Faculty regularly publish their work in peer-reviewed international journals such as Physical Review Letters, Physical Review A, Physical Review D, Nature Photonics, Frontiers in Optics, American Journal of Physics to name a few.

The service and outreach activities include: laboratory tours of our Macdonald Laboratory's high intensity lasers and ion-atom collisions for K-12 students and interested adult groups; science demonstrations in four-year colleges and K-12 schools all over the State of Kansas. Several faculty members have taken a leadership role in the NSF-funded workshops for females to include EXCITE for high school students and the Girls Researching Our World (GROW) workshop for middle school students. Facilities and equipment are provided for the use of the Upward Bound program (9<sup>th</sup> -12<sup>th</sup> graders from Junction City, Manhattan, Riley County, and Wamego High Schools).

***Quality of Students.*** ACT Composite and Math scores are both above the 90<sup>th</sup> percentile for undergraduate students. Most importantly we have significantly increased our enrollment over the last eight years and average scores have stayed above the 90<sup>th</sup> percentile. The quality of our students is reflected in our 2014-2015 graduating class where over 40% of its members received honors (Magna Cum Laude or Summa Cum Laude). Many of our undergraduate students participate in research. Additionally, while nationwide, approximately 1/3 of physics majors seek an additional

major or degree, nearly 50% of our successful graduates earn a second major or degree (usually mathematics, chemistry, engineering or education). This is an indicator of the quality of our students as well as the Department of Physics' increased ability to successfully advise students with interdisciplinary interests.

Evidence of the high quality of our graduate students comes from the recognitions and awards received and the fact that every Ph.D. student will publish at least one peer-reviewed paper and most will publish more. We admit 12-15 students/year to our Ph.D. program. The graduation rate from our Ph.D. program is 70%. Of the remainder who came to do a Ph.D., 25% graduate with an M.S. degree making an overall graduation rate from our graduate program of 95%.

***Employer Demand.*** The American Physical Society indicates strong demand for undergraduates with a B.S. in physics with most demand coming from Engineering (30%) and Computer and Information (24%) companies. Of these, 61% of the jobs are in the private sector, 19% are in education, and 11% are in active military and national labs. Companies that our students have gone on to work for include: Arbor Scientific, Century Tel, ITT Space Systems, Reeves Wireline Services, State Department of Transportation, Tradebot Systems, US Patent Office (multiple examples), high school teaching, GE Aviation, and Westar Energy. A graduate with a B.S. in physics from K-State who is now a project leader at Ball Aerospace said in a colloquium that members of her team with physics degrees are highly valued because they can understand and talk with all team members who are physical science or engineering specialists.

The American Physical Society (APS) statistical page indicates strong societal demand for students with STEM (Science, Technology, Engineering and Math) degrees, including physics. Among Ph.D. graduates from K-State 37% went on to do research postdocs, 25% accepted faculty positions, 30% joined high tech companies while 4% are in other areas and 3% are unknown. Among M.S. graduates at K-State, 40% continued in Ph.D. programs, 30% moved on to work at high tech companies, and 26% became instructors at various colleges including West Point. No area of the country is favored by our graduates since they are distributed throughout the U.S.

***Service Provided to the Discipline, the University and Beyond.*** The total number of service hours in 2015 was 14,094, an increase of 12% over its amount in 2009. We have five introductory physics tracks designed to accommodate the diverse needs of K-State students: PHYS 101, 102 and 103 for the non-scientist; PHYS 106 for education majors; PHYS 113 for biology, kinesiology and agronomy, PHYS 114 for biology; PHYS 115 for architecture and agronomy, PHYS 213 and 214 for engineers; PHYS 451 and 452 for education majors. In addition we offer PHYS 191 (astronomy) to all majors, and PHYS 325 for physics majors and minors. Our Physics Education group has contributed to PhysPort, a website that supports physics faculty in implementing research-based teaching practices in their classrooms, by providing expert recommendations about teaching methods, assessment, and results from physics education research (PER). Our goal is to synthesize and translate the results of this research so that it can be used in today's classrooms.

***Cost Effectiveness.*** Faculty time is divided up as 50% teaching, 40% research and 10% service. Faculty salaries and Graduate Teaching and Research Assistant salaries are lower compared to the national average and lag behind our peers. The research output as measured by federal research dollars is well above our peer average and all faculty continue to be productive publishing papers in peer-reviewed journals. Faculty teach a large number of service courses as well as undergraduate and graduate classes while maintaining a high quality of teaching as evidenced by teaching awards. On average six faculty are dedicated to our graduate courses at any one time. The costs of support of equipment required for students and the necessary infrastructure are funded by grants from federal agencies (NSF, DOE, NIST, US Airforce, US Army, and NIH).

## **Plant Pathology: Master's and Doctorate – CIP Code – 26.0305**

***Mission, Centrality, Uniqueness.*** Our graduate degree programs have the specific mission to train future plant pathologists and other students with an in-depth knowledge of plant pathology and aligned disciplines through both classes and independent research projects, spanning basic to applied topics. In addition, the Department seeks to educate and serve our stakeholders, including crop producers and consultants, county agents, commodity groups, and anyone from the public with a plant health issue. The centrality of plant pathology within agriculture is highlighted by the importance of managing plant diseases. Among all states, Kansas ranks second in total cropland and first in production of wheat and sorghum. Diseases are an important constraint to sustainable production for several commodities in Kansas. Through the development of effective disease management programs and education, losses have been reduced to approximately 10% in recent years with an estimated economic impact to the state of over \$75 million per year. Such disease management outcomes demonstrate the centrality of the Department to the mission of Kansas' Land Grant University. The Department is the only provider of M.S. and Ph.D. degrees in Plant Pathology in the state and offers students the opportunity for in-depth training across various specialties within plant pathology and allied plant sciences, as well as specialization in a sub-discipline. Graduate programs in Plant Pathology exist elsewhere in the country, but none focus their research efforts on controlling diseases of Kansas crops. Additionally, our program is known for its strength in research on mechanisms of host plant resistance, pathogen biology, and the molecular biology of host-pathogen interactions.

***Quality of the Faculty.*** The graduate faculty in the Department includes members who have received their graduate training in diverse fields including plant pathology, plant molecular biology, genetics, plant breeding, biochemistry, crop science, microbiology, and biology. These disciplines are necessary to address plant health problems. The faculty includes internationally recognized researchers and teachers who publish in prestigious journals and have annually received over \$7 million in external research funding over the last four years, in five of the last seven years, and have received an average of over \$7 million over the last eight years. Despite being a relatively small department (two dozen Faculty members plus or minus a few over the last eight years), this level of external funding puts the Department at or among the top of all departments in the KSU College of Agriculture. Three of our faculty members are University Distinguished Professors (UDPs), out of a total of eight in the entire College. Our Extension program provides outreach by developing and delivering programs and materials that bring the latest science-based information to the field crop and horticultural industries in the state and that also educate homeowners about lawn and garden issues. Over ten faculty members have won state, national, and international awards. The excellent reputations of our faculty attract students to KSU. Members of our faculty have also been recognized for their excellence in teaching through University and national society awards, including a National Excellence in Teaching Award from APS. An External Program Review Team from 2009 noted "faculty enthusiasm and dedication to teaching were strong and evident in a number of different ways." It further noted that "course content within curricula remain current" and "faculty members have incorporated innovative approaches to teaching in their courses to enhance student learning experiences."

***Quality of Degree Programs.*** High quality students are chosen for admission based on previous academic success (at the undergraduate level for the M.S. and Ph.D. program and at the M.S. level, if applicable, for the Ph.D. program), interest in faculty members' research programs, and demonstration of aptitude or success in scientific research. Both M.S., and Ph.D. programs have seen a recent decrease (more pronounced in the M.S. program) that probably can be attributed to increased competitiveness for grant funding and the fact that nearly all of our graduate students in both programs get generous stipends and their tuition covered through investigator-funded graduate research assistantships (GRAs). The quality of our students is demonstrated by their successes in academic scholarship. We receive many well-qualified applications yearly for admissions, normally



4× the available positions (limited by funding) in the M.S. and Ph.D. programs. The most recent (2009) External Program Review Team noted that the Department “serves a vital role for Kansas agriculture through its research, education and extension activities.” They further noted that the M.S. and Ph.D. programs “consist of well-rounded curricula that provide appropriate breadth to the subject areas... overall, the graduate program in plant pathology at KSU is capable of providing students with a strong background in plant pathology.”

***Employer Demand.*** The Department is training plant pathologists who are highly competitive for academic, governmental, and industrial jobs within our state, region, and nation as well as international academic jobs. The employment history for graduates of the Department since 2008 shows that former M.S. students most frequently obtain research scientist or technician jobs in academia or industry, primarily in Kansas or other Midwestern states (West North Central region). A minority of M.S. degree earners work towards their Ph.D. degree, either at Kansas State or at other regional universities. Nearly all graduates with Ph.D. degrees initially obtain post-doctoral positions at Kansas State, other leading universities in the U.S, or even internationally, and most of these subsequently obtain faculty positions worldwide (*e.g.*, Australia, Costa Rica, India, Puerto Rico, or elsewhere in the U.S.). A minority of graduates with Ph.Ds. obtain industry research positions, primarily in the Midwest. Employer demand for students with advanced plant pathology degrees from our graduate programs remains high, as evidenced by a 100% rate of successful employment for graduates during the past seven years. As national and international efforts to increase agricultural production, reduce post-harvest losses, and manage plant disease increase for the purpose of sustainably feeding the growing global population, the need for our graduates trained in plant pathology in both industry research scientist jobs and university faculty jobs is only expected to increase.

***Service Provided to the Discipline, the University and Beyond.*** The Department offers numerous resources and services to the Kansas State community, to Kansas more broadly, and to national and international constituents. These include the Integrated Genomics Facility (IGF), the Plant Biotechnology Center, and the Plant Transformation Facility (serving KSU and other U.S. university researchers) and the Plant Disease Diagnostic Lab, which serves Kansas and is also the hub lab for the Great Plains Diagnostic Network, which coordinates diagnostics and training of first detectors in a nine-state region and is an important component of our state’s and nation’s agricultural security. The department also serves scientific researchers nationally by housing both the Fungal Genetics Stock Center and the Wheat Genetic and Genomic Resources Center. The Department’s Faculty with Extension responsibilities are an active part of commodity-based extension teams within KSU’s College of Agriculture and provide media relations, extension publication development, and provide information and training to county agriculture agents and crop consultants. The Department offers a full range of courses leading to the M.S. and Ph.D. degrees in Plant Pathology; these same courses draw students from other degree programs (especially graduate courses in genetics, genomics, biotechnology, bioinformatics and the molecular biology of plants and microbes). Additionally, the Department offers service courses with laboratory components aimed at or required by undergraduates pursuing majors in other degree programs (particularly Agronomy).

***Cost Effectiveness.*** The Department’s primary focus is research, and the cutting-edge equipment that is needed for the research programs in the Department is also used in courses, increasing efficiency. The Department has only about three teaching FTE’s scattered among the 21 Faculty, yet still offers 37 courses with 22 of those being traditional courses. Most graduate students in the Department are supported as GRAs by external research grants awarded to individual Faculty.

**Statistics and Data Science: Bachelor's – CIP Code – 27.0501**  
**Statistics: Master's and Doctorate - CIP Code – 27.0501**

***Mission, Centrality, Uniqueness.***

The mission of statistics at Kansas State University is to continue the department's 56 year tradition of excellence by training and educating future generations of statisticians through its highly recognized BS/BA, MS and PhD programs; communicating statistics and statistical thought through quality education in graduate and undergraduate service courses; pursuing theoretical and applied research driven by novel data types that arise in a variety of scientific contexts; contributing to Kansas State research in science, engineering and the social sciences through active collaboration.

The quality of research undertaken at Kansas State is greatly influenced by the existence of the Department of Statistics and the willingness of the faculty and students to work with and consult with researchers from across the university. In the ensuing years since our founding the statistics profession has seen at least two significant transformations. One was the advent of readily accessible computing technologies that made possible analytical techniques that had before been beyond practicality. The second is the more recent emergence of biotechnologies that produce data on unprecedented scales. It has been argued that the production of new data is quickly outpacing the ability to analyze, interpret, and draw conclusions from it. The statistics department at K-State has adapted to the new opportunities presented by these transformations and the faculty are engaged in moving the science of statistics forward while also aiding the other sciences in their progress towards better understandings of our world. The statistics profession in general, and statisticians in particular are poised to play a critical role in the advancement of society and the technologies that go with it.

***Quality of the Faculty.*** The department currently has 16 full time faculty with another to join in fall 2016. Of these, all but one joined the department since 2002. All faculty have a PhD degree and are members of the Graduate Faculty. Part time PhD faculty have occasionally assisted with course demands. The department teaches a large number of undergraduate and graduate credit hours as there is strong demand for statistics coursework from programs across campus, and there has been a growing demand in online statistics instruction as well. All faculty, regardless of tenure-track or not, have a research expectation associated with their appointment. This facilitates the integration of real life examples into course content. Incorporation of technology, relevant examples, student participation in co-authorship, conference presentations, and supervised departmental consulting contribute to a quality learning experience for the department's majors as well as other majors across campus.

During the past year faculty published 42 peer reviewed research papers published in top scientific journals. One faculty in statistics was recently informed that she was the recipient of a best paper award in an applied statistics journal and was invited to speak about it at an international conference in Florence. Many other faculty have been invited to speak at conferences and have been organizers of conference sessions around the world. Grant activity, both proposals and awards, has increased substantially over the past five years versus the previous five. Statisticians are not in need of large laboratory equipment expenditures and, so, the amounts of their grants are smaller than some other fields. One faculty in statistics is currently on grants totaling over \$1.2 million.

***Quality of Degree Programs.*** At the start of FY2016 there were 21 BS, 22 MS and 37 PhD students majoring in statistics at K-State. In addition there were 34 undergraduates pursuing a minor in statistics. The proportion of MS to PhD candidates is roughly reversed from where it was 4-5 years ago, and the number of undergraduate majors is up from 13 at the start of FY11. Moreover, an end of FY16 count showed the number of undergraduate majors in statistics had risen to 30. Many undergraduate majors in statistics switch majors to statistics after enrolling at K-State or add statistics as a co-major (often to economics or mathematics). Two departmental 2025 strategies are to increase

the number of PhD graduates and to enhance the undergraduate program. In fall 2013 the department received 59 applications and admitted 31. In Fall 2016 it received 71 applications and admitted 41.

PhD students and nearly all MS students work with professors on a research project (dissertation or MS report). Areas of faculty research are wide ranging and are generally motivated by questions originating from the other sciences. Of particular note is the increased interests and applications in high-dimensional data/big data, and several faculty specialize on research topics in these areas. The curriculums in statistics is regularly updated to adapt to new developments in statistics and as new research strengths are hired into the faculty.

**External Demand.** US News & World Report recently ranked ‘Statistician’ number 1 in ‘best business job,’ number 3 in ‘best STEM job,’ and number 17 in ‘100 best jobs.’ The pharmaceutical and medical industries, government, the energy industry, and universities are among the employers of statisticians. Many undergraduate majors continue on to graduate school – one of our spring 2016 graduates is attending graduate school in biostatistics at Yale. The American Statistical Association (ASA) regularly conducts surveys and reports on opportunities for statisticians. They recently (January 18, 2016) reported that, according to the US Bureau of Labor Statistics, statistician is projected to be one of the top 10 fastest growing jobs in the US. From 2014 to 2024 employment of statisticians is projected to grow by 34%. And total employment for statisticians has already grown by 54% since the year 2000. The median starting salary for an undergraduate was \$56,000 in a 2013 ASA survey and graduates with a MS or PhD showed a median starting salary near \$75,000 and \$102,000, respectively, in the same survey. Of 76 MS statistics graduates from K-State during the past eight years, a survey by the Alumni Association received responses from 28 regarding employment information. Of these, six worked in education and the rest in industry or government as consultants and/or analysts. Similarly, of 27 PhD graduates during the past eight years an Alumni Association survey had received responses from 17. Of those 17, eight were in academics and the rest in industry or government. In industry, pharmaceutical companies are the largest source of jobs for our graduates, but food biotechnology companies, medical research facilities/hospitals, and insurance companies are also sources. Salary data were not available from the Alumni Association but available knowledge of starting salaries of particular K-State PhD graduates in statistics indicates their initial offers were over \$90,000 with some more than \$100,000.

**Service Provided to the Discipline, the University and Beyond.** The department teaches a large number of credit hours to non-statistics majors on campus. In fact, 94.1% of the credit hours delivered by the Department of Statistics are delivered to non-statistics majors. The number of full time graduate faculty who were available to deliver these courses averaged 13 per year over that same five year period. The Kansas Board of Regents recently approved the renaming of the undergraduate degree from ‘Statistics’ to ‘Statistics and Data Science,’ reflecting an adjustment to the curriculum based on the evolving nature of the profession and a more accurate reflection of the undergraduate educational experience in our program.

The Statistical Consulting Laboratory has been in operation since 1946 and is staffed by two faculty partially funded by K-State Research and Extension (KSRE), a staff consultant, and two graduate research assistants (GRA). The Laboratory provides consulting help to student and faculty researchers across campus on a walk-in or appointment basis. The two faculty members consult and collaborate on research projects that are more substantive, long term, and needing of more specialized statistical skill. These two consulting faculty consulted with over 100 campus researchers in 2015 alone.

**Cost Effectiveness.** The department delivered 14,334 student credit hours in fiscal year 2015, a seven percent increase from 2009 that included over a 22 percent increase for courses below the 300 level. The number of graduate student majors during this period has held stable depending on available financial resources for assistantships. The number of undergraduate majors is relatively small but

growing, seeing an increase of 40% in majors and nearly an eight fold increase in minors over the period since 2009. The number of full time faculty increased from 13 to 16, but only one of those new lines is on the state general use budget. That position was created to support a new MPH program created at K-State in which the department delivered education, student mentorship, and consulting in biostatistics. The other two new faculty lines are entirely supported with dollars earned through the Global Campus online courses and were hired to absorb the teaching load after faculty retired who had been teaching those as overloads. General use instructional expenditures increased only 7.3% from fiscal year 2008 to 2015. The increased demand for graduate and undergraduate coursework in statistics across campus, combined with our number of majors compared with number of tenure/tenure-track faculty creates a tension between immediate demands and longer term 2025 directions that include an enhanced undergraduate program. The faculty are stepping up to the demands, but there is concern that it cannot be sustained. Sustaining this current productivity level while dealing with the challenges of downward budget pressures draw into question the continued recruitment and retention of quality faculty and students, continued development and adaptation of the academic curricula, and ongoing progress towards 2025 goals.