

**ARCHITECTURAL ENGINEERING
UNDERGRADUATE GUIDE**

***BACHELOR OF SCIENCE
IN ARCHITECTURAL
ENGINEERING
(BS ARCE)***



THE UNIVERSITY OF KANSAS

CEAE DEPARTMENT

***Revised
July 5th, 2013***

Our B.S. ARCE Program Educational Objective:

***To prepare students for professional engineering practice
or graduate study in the analysis, design, construction,
and operation of building systems***

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If you have corrections or suggestions for future editions of this ARCE Undergraduate Guide please forward them in writing to Professor Rock in 2134-D Learned Hall, docrock@ku.edu.

Updated versions of this document may be available from the department office or on our website via www.arce.ku.edu.

KU ARCHITECTURAL ENGINEERING PROGRAM

*UNDERGRADUATE GUIDE*¹

Welcome to the University of Kansas (KU), the School of Engineering (SoE), the Civil, Environmental, and Architectural Engineering (CEAE) Department, and the Architectural Engineering (ARCE; pronounced Arc-E) Program! The faculty, staff, and your fellow students know that your time with us will be challenging as well as very rewarding. We work together as a team to provide high quality educational and research experiences for all. The ARCE faculty prepared this *Guide* to help you to become a successful member of our community and to complete your degree requirements efficiently. Please read this document as soon as possible and review it before each meeting with your ARCE academic advisor.

After you are settled into your living arrangements you should locate and visit Learned, Eaton, and Marvin Halls. Learned and Eaton Halls are on the northwest corner of 15th Street and Naismith Drive, while Marvin Hall, home of the architecture program, is on Jayhawk Boulevard. The ARCE Program's faculty members have their offices in or near 2134 and 2150 Learned Hall; the KU Visitor Center (www.ku.edu/visit) can help you find us. When on campus introduce yourself to the Reta Solwa, Senior Administrative Assistant, in Room 2150 of Learned Hall, the main office of our CEAE Department. If you were not advised at a new student orientation session, get the name of the faculty member who is your academic advisor from Ms. Solwa. The ARCE program faculty members, of the CEAE Department, are:

Hongyi Cai, Ph.D. Assistant Professor. Lighting, daylighting, and human factors.
(2134-C Learned Hall; hyc@ku.edu)

Oswald Chong, Ph.D., LEED[®] A.P. Associate Professor. Sustainable engineering, construction engineering and management. (2134-B Learned Hall; Oswald@ku.edu)

Thomas E. Glavinich, D.E., P.E., F.AEI Associate Professor and Director. Power systems, illumination, and construction management. (2150-C Learned Hall; tglavinich@ku.edu)

W. Max Lucas, Ph.D., P.E. Professor and SADP Dean Emeritus. Structures, construction.

Robert H. Lyon, P.E. Contract Lecturer. Structural analysis and design.
(2134-E Learned Hall; blyon@ku.edu)

Mario A. Medina, Ph.D., P.E. Associate Professor. Building mechanical systems, energy management, materials science. (2160-F Learned Hall; mmedina@ku.edu)

Brian A. Rock, Ph.D., P.E., F.ASHRAE Associate Professor. Building mechanical systems, indoor air quality, solar, fire protection. (2134-D Learned Hall; docrock@ku.edu)

Daniel Tran, Ph.D. Assistant Professor. Construction engineering and management. (2135-C Learned Hall;)

In addition, faculty members of the structural engineering and other groups in the department also serve as BS ARCE student advisors, e.g., Profs. Mulinazzi and Bennett.

¹ **This Guide is intended to help admitted students complete their degree requirements in the University of Kansas Architectural Engineering Program. The Guide is periodically reviewed and revised. Please forward written comments, suggestions, or corrections for future versions of this document to the Prof. Rock at docrock@ku.edu. The rules and policies found in this document do not supersede those of the University, the School of Architecture, Design, and Planning, the School of Engineering, or the Civil, Environmental, and Architectural Engineering Department.**

The Architectural Engineering Program

The Program was founded in the 1912-13 academic year and has awarded the Bachelor of Science in Architectural Engineering (BS ARCE) degree since 1914. The first female graduate of the School of Engineering, Julia Carman, earned a BS ARCE in 1920. Our Master of Science in Architectural Engineering (MS ARCE) degree has been offered since 1955. In 1999, a Master of Construction Management (M CM) degree was added and later the CMGT course designator was created. The ARCE Program is one of about 18 nationally that offers an Engineering Accreditation Commission (EAC) of the Accreditation Board of Engineering and Technology (ABET; www.abet.org) accredited undergraduate degree in architectural engineering, and ours has been continuously accredited since accreditation began. In 2001 KU Architectural Engineering merged with Civil and Environmental Engineering to form the Civil, Environmental, and Architectural Engineering (CEAE) Department; the combined department has about 29 professors and also many lecturers and support staff. The Department's Chair is Prof. David Darwin, Ph.D., P.E.

Program Administration

Admission to the program is handled by the School of Engineering, in cooperation with the School of Architecture, Design, and Planning (SADP); the Dean of the School of Architecture, Design, and Planning is John C. Gaunt, FAIA. There are limited spaces in architectural studio courses so admission by the SoE to the ARCE program is very competitive. If you were admitted without a first-year confirmed studio space, Kyle Camarda, Ph.D., the SoE's Associate Dean for Undergraduate Studies, will inform you when one becomes available.

After being admitted, your progress-to-degree is overseen by the ARCE faculty, the CEAE Department, and the School of Engineering. For example, after you see your advisor in Architectural Engineering you will submit your completed advising form to Ms. Reta Solwa in 2150 Learned Hall to have your SoE advising-hold released. This release is required for you to enroll on-line for the next semester or summer session. Your final degree requirements-check will also be performed by the School of Engineering after you submit your on-line Application for Degree. The Dean of the School of Engineering is Michael Branicky, Sc.D., P.E. When visiting the Engineering Dean's Office at 1 Eaton Hall, you will likely interact with the undergraduate student staff, Amy Lampe (Director of Academic Services), or Kyle Camarda, Ph.D., Associate Dean.

Day-to-day administrative duties are handled by your program's faculty and staff. However it is your responsibility to know and follow all the rules and policies of the University, the School of Engineering, the CEAE Department, and the ARCE Program. For example make sure that you meet the required deadlines for advising, enrollment, tuition and fee payments, and graduation. You can find these various rules and policies from sources such as the University's *Undergraduate Catalog* (via www.ku.edu/academics/catalogs/), the on-line *Schedule of Classes* (classes.ku.edu), the School of Engineering's *Undergraduate Student Handbook* (www.engr.ku.edu/undergraduate/ or via 1 Eaton Hall), the Department (www.ceae.ku.edu or via 2150 Learned Hall), and the Program (www.arce.ku.edu).

Summary of Significant Events Toward Your Bachelor's Degree

- Be admitted to the BS ARCE degree program (start at <http://www.engr.ku.edu/prospective/>)
- Attend a summer orientation session (strongly recommended)
- Be advised and enroll for each semester
- Study hard and earn a good grade point average (GPA)
- Select an area of emphasis as described later in this *Guide* and the *Electives List*
- Join the umbrella Architectural Engineering Institute (optional, but recommended)
- Join the professional society of your area of emphasis (optional, but strongly recommended)
- If invited to, join honor societies (optional, but strongly recommended)
- Explore summer engineering internship opportunities (optional, but recommended)
- Submit an Application for Degree on-line (“Apply for Degree”) during the advising period before the semester in which you plan to graduate
- Take the Fundamentals of Engineering (F.E.) Exam no later than the semester before your last semester (required for graduation by the Department)
- Take the Graduate Records Exam (GRE) early in the semester before your last (recommended to keep graduate study as an option)
- Apply for Graduate School and/or seek employment in your last year
- Complete your course requirements (last 30 credit-hours must be at KU)
- Participate in the School of Engineering’s graduation recognition ceremony (optional)
- Walk down the hill in the University's May graduation ceremony (optional)
- Give the KU Alumni Association your forwarding address (optional)

Congratulations. You are now one of our valued alumni!



BS ARCE DEGREE REQUIREMENTS

To obtain your Bachelor of Science in Architectural Engineering (BS ARCE) degree you must complete at least 165 credit-hours of coursework. On our website (www.ceae.ku.edu/undergraduate/curriculum.html) are the current BS ARCE curriculum and *Electives List*. While you are encouraged to keep on track, studies have shown that less than 10% of students in all programs follow curricula exactly -- for example you may already have some transfer or Advanced Placement credit. You will work closely with your advisor each semester to optimize your course selections.

You are required to complete the courses listed in the version of the curriculum under which you were admitted or readmitted. However, as the profession changes, the faculty may adjust the curriculum. You can choose to complete your degree under either a revised or your original curriculum, as long as you remain continuously enrolled. The ARCE faculty members are very interested in your suggestions and post-graduation experiences that would be helpful for future revisions of the curriculum and course content.

Advising

You will receive enrollment information for each upcoming semester via e-mail. *Be sure that KU has your current e-mail address, phone number, and local and permanent postal addresses, and check for messages frequently!* Also regularly empty your e-mail in-box and trash folders to prevent bounce-backs of important messages. *You can update your contact information at 121 Strong Hall or on-line via <http://www.registrar.ku.edu/changing-information>.*

The CEAE Department schedules about two weeks per semester for advising appointments, so when you receive your enrollment instructions from KU you must come to Learned Hall to sign up for a time slot with your assigned advisor. Check the list posted outside 2150 Learned Hall, just before and during advising periods, to see if your advisor has changed. You must see your assigned advisor but you can request a different one if, for example, you change your area of emphasis. Request a change of advisor via Ms. Reta Solwa. During advising periods each advisor should have sign-up sheets posted on his or her office door; if not, ask. Advising for the spring semester is usually just after Fall Break. The advising period for the summer session and fall semester normally occurs immediately after Spring Break.

Before you meet with your advisor each semester you should review this *Guide*, the curriculum and *Electives List*, and the current *Schedule of Classes* (classes.ku.edu) to refamiliarize yourself with your degree requirements, and to determine what courses are being offered and when they meet. Work out a rough schedule and a couple alternative courses and bring them with you to your appointment. Be sure that you have completed all prerequisites before attempting a particular course.

Your advisor should have your green-colored advising folder and an Engineering Course Selection form. After you and your advisor meet and have selected appropriate courses, your advisor or you will complete your final selection form in ink. After both you and your advisor have signed and dated the form, ask Ms. Solwa in 2150 Learned Hall to make a photocopy of it for you for enrolling on-line. She will retain the original form and will release your advising-hold soon thereafter. Your advisor will retain your folder. An on-line advising tool, to replace this on-paper process, is under development.

If you miss your advising appointment, sign up for another time slot during that advising period. Do not wait until the last minute for advising because you may not complete the required steps, including release of any holds before your on-line enrollment time (found via students.ku.edu). If you need to see your advisor to modify your enrollment after the advising period, or for other reasons, check his or her door

for established office hours, or phone or e-mail him or her to make an appointment.

To speed your graduation, and/or to lighten your fall/spring course loads, give serious consideration to completing a summer session or two at KU. Chemistry, Physics, English, many electives, and lower-level engineering courses such as thermodynamics, fluid mechanics, and strength of materials are usually offered. Architecture (ARCH) may offer summer courses such as study-abroad design studio.

Curriculum

The current curriculum for the KU Bachelor of Science in Architectural Engineering degree can be found via www.ceae.ku.edu/undergraduate/curriculum.html. The BS ARCE *Electives List* is available too, also in PDF.

English Requirements

BS ARCE students are required to complete six credit-hours of English, and for most students this will be through completion of ENGL 101 and ENGL 102. If you have advanced placement into ENGL 102 or 105 you will still need to complete another three credit-hour English course. Any course that has ENGL 102 as a prerequisite is acceptable. ENGL 362, Technical Writing, is suggested as a second English course. Also, ENGL 362 can be taken as another KU Core elective.

All students, including international, must complete at least one required English course each semester until their ENGL 102 or 105 requirement is fulfilled.

Mathematics Requirements

The BS ARCE mathematics requirements are successful completion of MATH 121, MATH 122, MATH 220, MATH 290, and MATH 526. These requirements apply to new as well as transfer students. Those students not yet eligible for MATH 121 need to be placed in the appropriate prerequisite courses, e.g., MATH 104, by the KU Mathematics Department, 405 Snow Hall. It is recommended that one MATH course be taken each semester until all are completed through MATH 526. An exception is that both MATH 220 and 290 are normally completed in the same semester.

MATH 115 and 116 are lower-level calculus courses taken by business, architecture, and other students in many academic programs. MATH 121 and 122 are more rigorous calculus courses taken by students majoring in engineering and science, and are thus required in the ARCE curriculum.

MATH 123 and MATH 320 in the distant past were allowed as substitutes for MATH 250/ENGR 250 (now MATH 220/290) and MATH 526. Experience has shown that MATH 220, 290, and 526 are a better combination to prepare for the Fundamentals of Engineering (F.E.) exam, and for graduate study in engineering.

The Honors Program versions of the required MATH courses can be completed instead. For example, honors MATH 141 and 142 may replace MATH 121 and 122. Verify the appropriate honors courses with your advisor and the Honors Program (www.honors.ku.edu) in advance.

Physics and Chemistry Requirements

Your physics and chemistry requirements are completion of PHSX 211, PHSX 212, PHSX 216, and CHEM 130 or 150. New students must complete PHSX 211, PHSX 216, and PHSX 212. Transfer students who have at least four credit-hours in PHSX 114 need to complete PHSX 201, for one credit-hour, to then proceed to PHSX 212. However, such students should decide in their first couple days of classes

whether it is to their advantage to complete the full PHSX 211 and PHSX 216 courses before proceeding to PHSX 212. It is important for you to complete CHEM 130 or 150 before taking the F.E. exam, and preferably before ME 312, Thermodynamics even though chemistry is not a listed prerequisite.

Basic Science Elective

The BS ARCE curriculum includes a three credit-hour elective basic science course, and some popular selections are shown on the BS ARCE *Electives List*. These basic science courses have an "N" in the "Eligibility:" portion of the *Schedule of Classes*, but mathematics and computer science N courses are not accepted. Students pursuing the Structural or Construction emphasis should take a geology course. Those students interested in the Building Mechanical and Energy Systems emphasis should take EVRN 148 or ATMO 105. Lighting students should take PHSX 313. These courses are suggested because they are best suited for the respective areas of emphasis, although it is often the case that the basic science elective is completed before an area of technical emphasis is chosen.

KU Core Electives

The BS ARCE curriculum found at www.ceae.ku.edu/undergraduate/curriculum.html satisfies the Core requirements established by KU. Information about the KU Core and Core approved courses can be found at kucore.ku.edu. The KU Core comprises three general education (GE) goals and three advanced education (AE) goals, with a corresponding set of learning outcomes associated with each of the six goals. To satisfy the requirements of the KU core a student must complete a total of 12 units. A KU Core unit is defined as an approved course, and approved educational experience, or an approved combination of course work and experiences.

Of the total 12 units required by the KU Core, eight are satisfied by required courses in the BS ARCE curriculum. These eight courses (and their outcome codes) are PHSX 211 General Physics I (GE1.1), MATH 121 Calculus I (GE1.2), ENGL 101 Composition (GE2.1), ENGL 102 Critical Reading and Writing (GE2.1), COMS 130 Speaker-Audience Communications (GE2.2), CHEM 130 or 150

ARCHITECTURAL ENGINEERING KU CORE DISTRIBUTION	
	<u>CRITICAL THINKING & QUANTITATIVE LITERACY</u> CRITICAL THINKING: PHSX 211 QUANTITATIVE LITERACY: MATH 121
	<u>COMMUNICATION</u> WRITTEN COMMUNICATION: SIX HOURS OF ENGLISH COURSES ORAL COMMUNICATION: COMS 130
	<u>BREADTH OF KNOWLEDGE</u> ARTS & HUMANITIES: ARCH 540 NATURAL SCIENCES: CHEM 150 SOCIAL SCIENCES: MEET VIA KU CORE REQUIREMENTS
	<u>CULTURE & DIVERSITY</u> DIVERSITY IN UNITED STATES: MEET VIA KU CORE COURSES GLOBAL AWARENESS: MEET VIA KU CORE COURSES
	<u>SOCIAL RESPONSIBILITY & ETHICS</u> ETHICS & SOCIAL RESPONSIBILITY: MEET VIA KU CORE REQUIREMENTS, OR ONLINE MODULE
	<u>INTREGRATION & CREATIVITY</u> CAPSTONE: CE 562
ARCHITECTURAL ENGINEERING SPECIFIC GENERAL EDUCATION REQUIREMENTS: Must complete 6 hours of English, COMS 130. Culture & Diversity goals must be met through approved courses. Visit kucore.ku.edu/courses for approved courses and activities.	

Chemistry (GE3N), ARCH 540 Global History of Architecture I (GE3A), and CE 562 Design of Steel Structures (AE6.12).

The remaining four units of the KU Core in the BS ARCE curriculum are completed through elective courses in Social Sciences (GE3S), Human Diversity (AE4.1), Global Awareness (AE4.2), and Ethics and Social Responsibility (AE5.1). While students are allowed to pursue approved educational experiences to satisfy the requirements of the KU Core curriculum, educational experiences will not fulfill the architectural engineering curriculum requirements for those courses.

Architectural Studio Requirements

You will complete ARCH 100, 101, and 200 as part of your BS ARCE degree program. If you will continue your studies toward an NAAB-accredited Master of Architecture (M.ARCH) degree at KU, you should likely complete more design studio courses during your undergraduate ARCE program. Consult with an architecture advisor in Marvin Hall on studio placement. If pursuing the M.ARCH consider attending summer sessions to complete other courses so that you can take more design studios in the fall and/or spring semesters. Also check to see if an appropriate studio course is offered in the summer session, including study-abroad in Italy, for example. If you have a light course load in your last undergraduate semester, and you have been admitted to the Master of Architecture or any other graduate program at KU, you may be able to reserve up to six credit-hours of extra coursework toward your graduate degree. You must apply for admission to the Graduate School (www.graduate.ku.edu) and complete some extra paperwork, in advance, to have these additional courses reserved for graduate credit at KU.

Programming and Drafting Courses

EECS 137, Visual Basic for Engineers, and *not* EECS 128 or 138, is the required computer-programming course for ARCEs. Learning to program allows you to logically break a large problem into smaller, more solvable ones; programming is also required in some higher-level undergraduate and many graduate engineering courses.

Building Information Modeling (BIM) and computer-aided design and drafting (CADD) skills are needed in ARCE 680 and other courses; ARCE 217 is the required introductory course. Primarily 2-D CADD skills are needed, but some 3-D work may be needed in ARCE 680 or other courses.

Engineering Sciences Requirements

Your required engineering science (ES) courses are ARCE 217, ARCE 350, CMGT 357, ARCE 660, CE 301 (or CE/ME 201 + CE 300), CE 310, CE 461, EECS 315, ME 312, and ME 510 (or CE 330). You also have a three credit-hour engineering science elective; suggested electives for your area of emphasis appear in the BS ARCE *Electives List* on our website. It is to your advantage to have all your engineering science courses completed before you attempt the Fundamentals of Engineering exam, taken typically by ARCEs in their second semester of their fourth year.

If CE 301 (Statics and Dynamics) does not fit in your schedule, you may substitute CE or ME 201 (Statics) and CE 300 (Dynamics). It is important to complete Statics early because it is a prerequisite for CE 310, Strength of Materials. CE 330 (Fluid Mechanics) has Dynamics as a prerequisite; ME 510 (Fluid Mechanics) requires Thermodynamics (ME 312).

Engineering Design Requirements

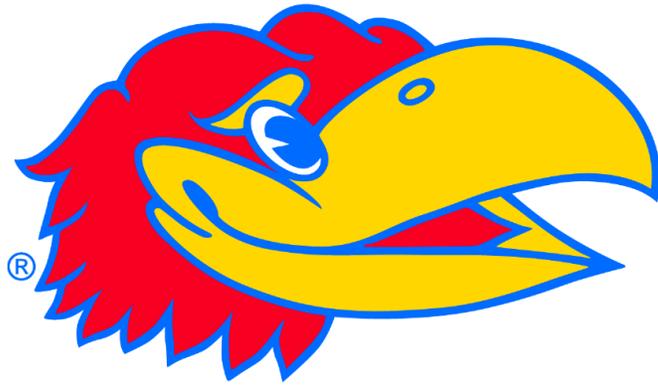
Your required engineering design (ED) courses are ARCE 101, CMGT 500, CE 562, CE 563, ARCE 640, ARCE 650, ARCE 661, ARCE 680, and ARCE 681. Additionally, you have six to nine credit-hours of engineering design elective courses; suggestions of electives for your technical emphasis appear in the *Electives List*.

ARCE 680 and 681, Architectural Engineering Design I and II, have prerequisites of CMGT 500, ARCE 640, 650, and 661, as well as CE 562 and 563. You must also have substantial CADD/BIM and plotting skills, either through coursework (e.g., ARCE 217) or work experience before enrolling in ARCE 680. In taking your engineering science and design courses, be aware that you will need to apply the knowledge you gain in these courses to realistic design problems in ARCE 680 and 681; retain your ES and ED course materials because you will need them for ARCE 680. In our first capstone course, ARCE 680, all students complete structural, mechanical, illumination, and power systems analyses and designs. For the second capstone course, ARCE 681, at least four separate sections are usually offered: 1) structural, 2) construction (CMGT), 3) building lighting and electrical systems (L/E), and 4) building mechanical and energy systems (HVAC/Solar/EM/FPE/etc.). Additional sections may be available, for example in acoustics.

With permission of the specific ARCE 681 instructor, final year BS ARCE students who have completed the other prerequisites may take ARCE 681 before 680 if it will allow them to graduate a semester sooner, i.e. in December. For students who have a delayed architectural studio sequence, or are pre-architecture (M.ARCH), it is often possible to take an architecture studio course and ARCE 680 or ARCE 681 in the same semester if the meeting times do not conflict.

Architectural Design Electives

The curriculum includes up to three credit-hours of architectural design electives. The BS ARCE *Electives List* gives suggestions. Students intending to pursue the Master of Architecture degree should likely complete an architectural design studio course with these hours. Permission to enroll in design studio courses beyond ARCH 200 must be obtained in advance from the Architecture Program, in Marvin Hall. The Architecture faculty will likely ask to review a portfolio of your design work, so be sure to retain or otherwise document (e.g., via photographs of models and large drawings) such materials from your required studio courses; see their website, www.sadp.ku.edu, for details on portfolio preparation and submission for review.



OTHER TOPICS OF INTEREST

Course Load

Full-time status at KU during a fall or spring semester usually requires enrollment in 12 credit-hours or more for undergraduates. But to complete your degree in ten semesters, you must successfully complete an average of almost 17 credit-hours per semester. If you will be employed or have other significant time commitments, you will likely need to reduce your course load. A general guideline is that three times your course credit-hours plus your employment hours per week should be less than or equal to 60 (known as “the Mulinazzi Rule”).

Many courses are offered in the summer at KU and can help you to graduate earlier or to lighten your fall/spring enrollments. A full-time summer course load is about eight credit-hours.

Special permission is required, in advance, for an undergraduate to take an 800-level or above course; normally 800- or 900-level courses cannot count toward an undergraduate degree at KU. Also, students in their last semester who are entering a graduate program can petition the Graduate School to take up to six extra credit-hours of graduate-level courses and reserve them for graduate credit.

Course Grading

In accordance with the University Senate Regulations, the letter grades A, B, C, D, F, and I are used for final grades in ARCE, CMGT, and CE courses. Pluses and minuses (+/-) are not assigned in our courses as they are for Architecture (ARCH) and Urban Planning (UBPL) courses. However, when you take a course in a department that uses the +/- system you will be graded in that course using the +/- system. Letter grades are defined by the University as:

- A** For work of marked excellence, indicating high honor.
- B** For work much more than average quality.
- C** For work of average quality.
- D** For work of the lowest quality that would enable the student to pursue, without undue lack of material or method, the next dependent course, whether this latter course be in the same department or in a related department.
- F** For work not of sufficiently high quality to merit credit for the course.
- I** Indicates that the student did not complete the work in that course by the designated date.

Architectural Engineering students are not required to retake a course in which they receive a D unless a higher grade is a prerequisite for another required course. But both your overall and engineering GPA must be 2.0 or higher to graduate; KU ARCEs strive for the highest GPAs possible to demonstrate their abilities and to preserve the most options for possible graduate study.

Credit/No Credit

No courses that count toward the BS ARCE may be taken as Credit/No Credit (C/NC). One course per semester not counted toward the BS ARCE may be taken as Credit/No Credit. Students taking extra courses toward a minor, a Master of Architecture, or any other degree, should check with that minor- or degree-granting program to determine if they accept Credit/No Credit grading for their required courses.

Adding and Dropping Courses

To add or drop courses after the initial open on-line add/drop period, get the appropriate forms from the Dean's Office in 1 Eaton Hall or Ms. Reta Solwa in 2150 Learned Hall and complete the forms in ink. If required, obtain your advisor's signature during his or her office-hours or via an appointment, and an engineering Dean's stamp, then proceed to Strong Hall's Enrollment Center.

The various professional Schools (Engineering, Architecture, Design, and Planning, Business, etc.) and the College of Liberal Arts and Sciences generally define three "drop periods" in each semester. Each of these drop periods usually has different requirements and restrictions. For a specific course, the rules of the division offering that course may apply, e.g., the deadlines and other restrictions may vary.

ARCE and CMGT courses are governed by the drop policy of the School of Engineering, and not the School of Architecture, Design, and Planning. The KU *Undergraduate Catalog* and the School of Engineering's *Undergraduate Student Handbook*, available on-line, have more detailed information about dropping courses, as well as the retake policy.

Academic Misconduct

ARCE students and faculty are subject to the academic misconduct policies found on KU's and the School of Engineering's websites. Some examples of academic misconduct by students include copying on exams or homework that are to be completed individually, improper reuse of previous work (plagiarism of written materials, software, or drawings), forging signatures, or altering enrollment forms or other records. If you find yourself in a questionable situation ask your instructor and/or advisor for guidance. Engineering ethics require that you report to the proper authority known incidents of academic misconduct either by students or faculty. Dealing with such problems early, tactfully, and with reasonable privacy is often the best approach to resolving them.

Study Abroad

Students are encouraged to take advantage of the study abroad opportunities offered by the various schools and the University. Many ARCE students have studied abroad for up to a year; the summer-studio in Italy offered by the Architecture Program has been popular. "Building Services Engineering" programs at European and Australian universities are somewhat comparable to our mechanical/energy and lighting/electrical emphases in ARCE. Study of structures is usually part of civil engineering programs in Europe. Due to differences in course offerings, semesters' timing, etc., you need to fully investigate your study-abroad program to ensure timely graduation from KU. You should start planning for study abroad at least one year in advance, and you need to be fluent in the language of instruction; the KU Study Abroad office, via Lippincott Hall or www.studyabroad.ku.edu, can assist you with your planning.

Honors Program

Qualified students are encouraged to participate in KU's Honors Program. Obtaining enough honors' credit-hours requires careful planning. More information can be found in the KU *Undergraduate Catalog* and via the Honors Program's website, www.honors.ku.edu, or at their office in the Nunemaker Center, 1506 Engel Road.

Edwards Campus Courses

Some higher-level electives and other courses have been offered at the Edwards Campus of KU in

Overland Park, KS, typically in the evenings. But, again, 800-level and higher courses normally cannot count toward an undergraduate degree at KU. If you enroll in a course at the Edwards Campus you will need reliable transportation. Also, the tuition and course fees are significantly different for the Edwards Campus than for the Lawrence Campus, so plan accordingly.

Engineering Fees

A special “differential tuition” fee is collected per credit-hour for all engineering courses. These funds are pooled and used to acquire instructional equipment, software, supplies, and services, e.g., the computers, printers, and plotter in the ARCE Senior Design Laboratory, 1137 Learned Hall. The SADP has instituted a support fee for its courses too. If you have an idea for an appropriate use of these collected fees, please forward a short note or e-mail to your ARCE advisor describing your suggestion.

Reciprocity

Eligible residents of Missouri in our BS ARCE program should apply each semester for tuition reduction through the annually-reviewed Kansas-Missouri reciprocity agreement. This agreement allows a varying number of Kansas residents to study dentistry in Missouri at in-state tuition rates, and Missouri residents to study architecture or architectural engineering in Kansas. You can obtain the necessary tuition-reduction request form from the School of Engineering’s Dean’s Office, 1 Eaton Hall.

Computers

Most of the ARCE faculty and students use MS Windows-based personal computers and software. While many microcomputers are provided at various locations in the Department, the School of Architecture, Design, and Planning, the School of Engineering, and the University, many students purchase their own. If you are considering acquiring a new personal computer, first determine what hardware and software you will need for your coursework. An "office suite" of software may be sufficient for at least your first semester or two and may be obtained through the KU IT department at a significantly reduced cost (<http://technology.ku.edu/software/>); acquiring a CADD or BIM license in advance is not recommended as they tend to be expensive and the versions change rapidly. AutoCAD® and Revit® are installed on PCs in many of the ARCE, CEAE, SoE, and SADP computer labs.

E-mail and SoE Computing

As soon as possible sign up for a free KU e-mail account on-line via <http://technology.ku.edu/-personal-accounts/>. Choose a logical username (e.g. Bob P. Smith would probably use "bpsmith") and a desired initial password. Your final e-mail address will then be something like "bpsmith@ku.edu." Avoid using a nickname or expression for your KU username as some e-mail recipients, potential employers for example, may consider your messages to be unidentifiable spam or unprofessional-sounding. Later you can create more-interesting aliases via www.email.ku.edu for corresponding with your friends, if desired.

There are many computers on campus where you can access your e-mail using a web browser or a freestanding e-mail client program. You should be able to logon to the hardwired desktop ARCE, CEAE, and SoE computers using “HOME” and your KU username (e.g., “bpsmith”) and password. Most of the engineering complex has WiFi service. Visit the School of Engineering Computing Services (SOECS) website, via www.engr.ku.edu/computing/, for more information and to submit any help requests.

World-Wide Web Home Pages

You can create and then store a personal home page using your KU account. The Department has a website at www.ceae.ku.edu. The Department's webpages are only for distributing lasting information about our programs and student organizations -- links are not provided to personal home pages. If your student group's home page needs updating, contact the organization's President or faculty advisor to volunteer.

Student Organizations

You are encouraged to participate in the various student organizations associated with the Program, the Department, the two Schools, and the University. However, be careful not to over-commit yourself -- your undergraduate studies should command most of your time and energy.

The Architectural Engineering Institute (AEI) is the umbrella organization for ARCEs. Specialty organizations are the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Associated General Contractors of America (AGC), Emerging Green Builders (EGB), the National Electrical Contractors Association (NECA), and the Illuminating Engineering Society of North America (IESNA). Phi Alpha Epsilon (Φ AE) is the national, discipline-specific architectural engineering honor society, and Tau Beta Pi (TBPi) is the national and school-wide engineering honor organization. Membership in one or more of these organizations as a student is usually low in cost, can help you build contacts in your field ("to network"), and can enhance your resume and student experience at KU.

Personal Library

You should retain all your texts, references, electronic media, handouts, and class notes to build a personal library. You should also regularly add to and update your library. By doing this you will significantly reduce the time you spend visiting libraries or searching the web to secure information. Through being a student member of various professional organizations you can usually obtain many otherwise expensive publications at substantial discounts. For example, the four volumes of the *ASHRAE Handbook*, in print or electronic format, are available to student members at about a 70% discount.

Summer Employment

A student who completes his or her BS ARCE in five years will have four summers when valuable work experience can be gained. The ARCE faculty recommends that you seek summer positions that will give you "real-world" construction, engineering design, and research experience. Working on job sites as a construction helper for your first summer or two will expose you to many design, construction, code, and safety issues. Working another summer as a CADD/BIM operator will hone your computer skills. Your last summer or two as an undergraduate should be spent as a design intern in a consulting engineering firm, as a construction management intern, and/or as an undergraduate research assistant (UGRA). Internships allow you to gain actual work experience but also give an employer a chance to evaluate you before committing to hire you permanently. A research assistantship introduces you to topics that may be pursued in graduate studies; ask the department's Graduate Advisor, Prof. Bruce McEnroe in 2150 Learned Hall, for information about research projects that may need UGRAs, and about our graduate degree programs.

Employment Placement Services

The School of Engineering offers valuable placement assistance through its Engineering Career

Services Center (ECSC) in 1001 Eaton Hall. Many manufacturing and engineering companies offer on-campus interviews through the ECSC, but ARCE students often seek summer and permanent positions directly from employers too. You are encouraged to use the Center and to participate in its Career Fairs, but your ARCE 681 instructor and/or academic advisor can likely help put you in direct contact with potential employers. Depending on current economic conditions, you should begin your permanent employment and/or graduate program search around the beginning of your last year of study; do not wait until your last semester. Start your job search by developing a highly-refined resume, registering with the ECSC, and networking via your professional society.

Professional Engineering Registration

You are encouraged to pursue registration as a Professional Engineer (P.E.). As of this writing, registration in the State of Kansas requires at least:

- A. an ABET-accredited Bachelor of Science in engineering degree,
- B. passage of the Fundamentals of Engineering Exam (F.E., formerly E.I.T.),
- C. four years of engineering experience under the direct supervision of a registered Professional Engineer, and
- D. passage of the Principles and Practices Exam (the "P.E." exam).

Your Bachelor of Science in Architectural Engineering degree is ABET-accredited. *You are strongly encouraged to take the F.E. exam immediately after completing your engineering sciences and other exam-covered topics; taking the exam is a requirement of the Department for graduation.* Several months are needed for your exam to be graded, and you would like to tell a potential employer that you have passed, so plan accordingly. Most ARCEs take this day-long exam in their fourth year; selecting the “general”/“other” afternoon section of the exam is recommended. The F.E. and P.E. exams are commonly offered in April and October of each year, but have deadlines for application many months in advance.

Seek permanent employment where you will work on engineering projects with increasing personal responsibility. You must work under the *direct* supervision of a P.E. to fulfill the experience requirement. Additionally, you will need letters of recommendation from at least two other Professional Engineers. Be sure to keep these others informed of your engineering activities during your four-year internship.

To help prepare for the mechanical, electrical, or civil/structural P.E. exam you should take as many engineering courses as possible in one of these emphases. Even after graduation you may want to complete extra courses to improve your performance on a P.E. exam. Some relevant CE, ME, EECS, and other courses are offered at KU's Edwards Campus in Overland Park, as well as in Lawrence.

You can obtain information on current Kansas registration requirements, procedures, and examinations from the Kansas State Board of Technical Professions via their website at www.ksbtp.ks.gov, by mail at 900 SW Jackson Street, Suite 507, Topeka, Kansas 66612-1257, or by calling (785) 296-3053. Applications for the Fundamentals of Engineering Exam may also be available at the School of Engineering's Dean's Office, 1 Eaton Hall.

Graduate Study in Engineering

Your undergraduate education in architectural engineering should prepare you for a fruitful entry-level position and career. However many students desire and seek a higher level of formal education, and

some engineering positions, especially in structural engineering, *require* advanced degrees. Earning KU's Master of Science in Architectural Engineering (MS ARCE), either directly after your bachelor's degree or after working for some time, will allow you to study in depth an area of specialization. The MS ARCE program is also open to graduates of other engineering disciplines who wish to pursue careers related to buildings. An MS can usually be completed in one or two years of full-time study including summers. Our Master of Construction Management (M CM) is offered too on the Lawrence Campus, however it is not an engineering degree – be sure to consider the MS ARCE with a construction emphasis if earning a graduate engineering degree is desired.

If you are interested in a potential career in engineering teaching and/or research, then you should earn both a Master of Science (with thesis) and a Doctor of Philosophy (Ph.D.) in engineering. Obtaining such degrees is a challenging and intellectually rewarding experience. If you seek both degrees, you should plan for at least five years of full-time, rigorous study past your bachelor's degree. To enhance your probabilities for admittance to and success in an engineering Ph.D. program, you should show excellence in completing advanced theoretical and numerical engineering courses in your Master's program.

The Architectural Engineering Program's Master of Science in Architectural Engineering degree requires 30 credit-hours. There are both thesis and report options. Areas of study include Mechanical and Energy Systems, Lighting and Electrical Systems, Construction Management, Structures, and hybrid or emerging topics such as sustainability or fire protection. Through advanced ARCE and other courses you and your advisor will assemble a graduate plan-of-study that will help you achieve your educational and professional goals. Even if you obtained your undergraduate degree at KU, you will still find many challenges awaiting you in our Master of Science program. You can learn more about our MS ARCE by visiting www.arce.ku.edu, and by visiting with the CEAE Graduate Advisor and ARCE professors. If you are interested in graduate study of structures, investigate KU's Master of Science in Civil Engineering program too. The “professional” (NAAB-accredited) Master of Architecture is available as well through the SADP. Many graduate-level CE, ARCH, and Engineering Management (EMGT) courses are offered at the Edwards Campus in Overland Park. Applications for graduate engineering admission are completed and submitted on-line via www.engr.ku.edu/prospective/graduate/apply/.

Architectural engineering does not offer a Ph.D. degree, but civil engineering does and ARCE professors can chair or serve on Ph.D. in CE committees. Profs. Rock and Medina can chair or serve on mechanical engineering Ph.D. committees; all ARCE faculty can likely serve on Ph.D. in architecture committees too. If you are considering earning a graduate degree, discuss it as early as possible with your advisor and the faculty members in your area of interest. More information on CEAE graduate degree programs can be obtained from www.ceae.ku.edu and the Graduate Advisor, Prof. Bruce McEnroe, in 2150 Learned Hall.

