Civil, Environmental, & Architectural Engineering
UNIVERSITY OF COLORADO **BOULDER**

Undergraduate Advising Guide for Architectural Engineering

Civil, Environmental, and Architectural Engineering
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Introduction

The purpose of this guide is to assist undergraduate students majoring in Architectural Engineering (AREN) to fulfill the AREN curriculum requirements for the Bachelor of Science (BS) degree. These requirements are structured to comply with College rules and to maintain our accreditation, in compliance with the rules of the Engineering Accreditation Commission of ABET (www.abet.org).

To respond to the rapid changes in technology and needs of the profession, our curriculum is dynamic, and consequently undergoes both major and minor revisions annually. As an undergraduate student, you will generally be expected to follow the curriculum in effect when you entered as a freshman. You should keep a copy of the university catalog and all written information including the version of the Advising Guide that was in effect when you entered the program. Copies of the curriculum, a course checklist, and a graphical flow chart are contained in this document. Alternatively, you may elect to follow a future revision to the curriculum in its entirety. If you decide to follow new curriculum guidelines, you must inform the Department.

The student is responsible for adherence to the AREN curriculum rules and requirements and should be aware that deviation from the planned sequence of courses may result in delayed graduation.

Mission Statement

The mission of the Department of Civil, Environmental, and Architectural Engineering is the education of undergraduate students to become leaders in the professional practice of engineering, contributing to technological advances that benefit humankind while enhancing the earth's physical and biological resources.

Program Educational Objectives

The educational objective of the Architectural Engineering program is to develop graduates who acquire the broad knowledge and skills necessary to successfully begin and sustain a career, and to become leaders who advance the state-of-the-art, in one of four core disciplines of the building industry:

- electrical and lighting systems
- heating, ventilating, and air conditioning (HVAC) systems
- structural systems
- construction engineering and management

The areas of knowledge required to achieve these objectives include both technical and non-technical areas. Technical areas include an elementary understanding of the fundamentals of architectural engineering, proficiency in the engineering sciences of buildings and their systems, proficiency in architectural engineering design and its integration across disciplines, and specialization in one of the four core areas of AREN practice. Non-technical areas include professional management and ethics, processes for communication, and broad exposure to the humanities and social sciences, especially architectural history.

These areas of knowledge must be complemented by skills in design, communication, and professional practice necessary to develop and sustain a career in the building industry. Design skills include problem definition, design workflow and processes, application of codes and standards, and design experience.

Communication skills include oral and written communication in the form of presentations, drawings, and report. Professional skills include resource allocation, planning, and teamwork.

While the educational objectives do not specifically address the development of graduates who pursue further graduate studies, it is recognized that advancing the state-of-the-art in the disciplines of the building industry may require additional education. To that end, the AREN program education objectives include graduate school in engineering and disciplines relevant to the building industry.

Student Outcomes

The outcomes that students are expected to have attained upon graduation with the Bachelor of Science degree in Architectural Engineering are:

1. the ability to apply knowledge of mathematics, science, and engineering
2. the ability to design and conduct experiments
3. the ability to analyze and interpret data
4. the ability to design a system or component to meet desired needs
5. the ability to function on multidisciplinary teams
6. the ability to identify, formulate, and solve engineering problems
7. an understanding of professional and ethical responsibilities
8. the ability to communicate effectively through writing and/or drawing
9. the ability to communicate effectively through oral presentations
10. an understanding of the impact of engineering on society
11. an understanding of the necessity to engage in life-long learning
12. a knowledge of contemporary issues in civil, environmental, and architectural engineering
13. the ability to use modern engineering techniques, skills, and tools

Accreditation and Assessment

The AREN program is accredited by the Engineering Accreditation Commission of ABET. Accreditation involves a process of continuous improvement using a series of assessment tools that measure how well the program is achieving its stated outcomes and objectives. As a student, you can expect to take part in the following evaluations during (and after) your academic career at CU:

- **Faculty Course Questionnaire (FCQ)** – You will evaluate and provide feedback in every course you take at CU at the end of every semester.

- **Fundamentals of Engineering (FE) Exam** – This national exam is the first step toward professional registration as an engineer and all AREN students are required to take the exam prior to graduation. Most students take it in their last semester at CU.

- **Senior Exit Survey** – In your last semester, you will be asked to fill out a survey administered by the College that asks how well the outcomes listed above were met, and your overall satisfaction with the program, department, faculty, etc.

- **Alumni Survey** – We will send you a survey five years after graduation to evaluate if we met the program educational objectives.

Advising

The faculty and staff are here because they have a true commitment to education and want to see students succeed. However, you the student are ultimately responsible for ensuring that all graduation requirements have been satisfied, and for seeking out the advice and help you need. To assist in this, each student is assigned a faculty advisor. You are free to change advisors to better serve your needs, with the approval of the new advisor (see CEAE department for advisor form). After selecting an area of specialty, a new advisor from that area will typically be assigned. The CEAE Undergraduate Coordinator can also assist you with many questions about the curriculum.

A) It is the individual student's responsibility to secure the approval of her/his faculty advisor for the course of study for each semester. This activity occurs during the group/individual advising period, of which notification will be sent in advance by email in each semester. After the advising session, the faculty advisor will sign the pink card in your file that will authorize the CEAE staff to remove the registration HOLD that prevents you from registering. IT IS NOT POSSIBLE TO REGISTER BEFORE THIS HOLD IS REMOVED.
B) Graduation requirements are met though one of four distinct concentrations within the AREN curriculum – electrical/lighting, mechanical (HVAC), structural, or construction. Each concentration has a specific set of required upper-division courses and recommended technical electives. During the third year, each student must select one of the concentration tracks. While students are randomly assigned an initial faculty advisor, students are encouraged to change faculty advisors to obtain advice from a faculty member in their area of concentration. With this alignment of interests, the faculty advisor will best be able to help you identify appropriate technical electives; discuss career options; and suggest opportunities for internships, research, and employment.
C) Block diagrams and graduation planners for each program are included in this guide. Each student is responsible for keeping his or her graduation planner up-to-date.
D) Not all courses are offered every semester. Those that are only offered once per year are marked on the block diagrams.
E) The minimum course load for full time enrollment is 12 credit hours. The maximum course load is 19 credit hours. Variation must be requested by petition to the college. After 18 credit hours, a tuition surcharge is applied.
F) If problems arise with advising, the following steps are suggested:
    i. See CEAE Undergraduate Coordinator.
    ii. See the Chair of the Operations Committee (Milan Halek).
    iii. Contact the Office of the Dean of the College (ECAD 100) for questions concerning College or University rules or policies.

For more information on the civil, environmental and architectural engineering program, visit our website at http://ceae.colorado.edu.

Transfer Procedures

The University and College have established procedures for admission of transfer students and evaluation of transfer credits. These policies are described on the undergraduate admissions website: http://admissions.colorado.edu/undergraduate/apply/transfer. However, once a student is admitted and transfer credits have been evaluated by the University, the CEAE Department is responsible for the final evaluation of the application of transfer credits to degree requirements. A student is required to obtain the approval of the CEAE Transfer Credit Evaluator for all transfer credits. Prof. Dobroslav

Znidarcic (dobroslav.znidarcic@colorado.edu) is the current (Fall 2012) CEAE Transfer Credit Evaluator. The following recommendations are offered:

A) It is the student's responsibility to ensure that transfer credits have been evaluated and approved by the Department.
B) Newly admitted transfer students should make an appointment with the CEAE Transfer Credit Evaluator as soon as possible to obtain final approval of transfer credits. A transfer credit approval form, signed by the Transfer Credit Evaluator, will be placed in the student's file and will be required for graduation. The form will also be used by advisors to inform academic guidance.
C) If there are questions or concerns about a transfer course, the Evaluator may request catalog pages or course descriptions, or may seek the advice of other faculty members. In some cases, it may be recommended that the student prepare a petition for transfer credit, with multiple levels of approval, to ensure that there will be no future questions. While the petition process may seem onerous, it is only used to protect the student's interest.
D) Transfer credit issues can also arise for current students who take one or more courses at other institutions during their academic career, e.g., study abroad programs or summer school at a local college. Current students who are planning to take courses at another institution should seek preliminary approval of the transfer credits before taking the courses.

Additional Advising Resources

There are many advising resources available at CU-Boulder, but students frequently do not know they exist or hesitate to take advantage of them:

College of Engineering Advising Guides

The College publishes a comprehensive set of advising guides to provide students with timely and accurate information. These guides are not intended as a substitute for personal interaction between student and advisor, but can be a great way to get answers to many common questions and concerns. Brief summaries of the curricula and requirements for individual majors in the College can be found at www.colorado.edu/engineering/academics along with the following advising guides:

Guide to Degrees, Minors & Certificates
Personalize Your Academic Experience
Academic Support
Advising & Registration
Career Services
Summer Session
Student Organizations
Internships, Research & Service Learning
Graduation Ceremonies
Undergraduate FAQs

The following College and University policies can also be found on the College website at www.colorado.edu/engineering/academics/policies:

Academic Honesty
Academic Policies
Academic Probation and Suspension
Classroom and Course-Related Behavior
Confirming Your Major
Four-Year Graduation Guarantee
Grading Policies
Grade Appeal Policy
Graduation Requirements
Humanities & Social Sciences/Writing
Student Conduct Code Policy
Student Honor Code Policy

Career Counseling

Career Services can help students and alumni clarify career interests, values and work-related skills; explore potential careers and employers; and refine job seeking, interviewing, and resume preparation skills. They host Career Fairs and Internship Fairs, sponsor resume writing workshops, and hold mock interview sessions. Career Services is located in the Center for Community (C4C) Room N352, (303) 492-6541, or you may visit their website: http://careerservices.colorado.edu.

Counseling and Psychological Services

This multicultural center provides a variety of programs and assistance to address general academic or personal issues. They are located in C4C (Center for Community), 303-492-6766, or visit their website: http://counseling.colorado.edu.

Graduation Requirements

Failure to complete the requirements listed below will postpone graduation. Any exceptions will require authorization from the CEAE Operations Committee and the Dean's Office. Students should meet with the CEAE Undergraduate Coordinator at least one semester prior to their planned graduation to review their records. It is the student's responsibility to be certain that all degree requirements have been met, to fill out the on-line diploma card, and to keep the CEAE Undergraduate Coordinator and the Dean's Office informed of any change in graduation plans.

To be eligible for the AREN BS degree, students must meet the following minimum requirements:

1. The satisfactory completion of the prescribed and elective work in the AREN BS curriculum. A student must complete a minimum number of **128** semester hours, of which **the last 45 shall be earned after admission to the College of Engineering and Applied Science as a degree student**.
2. A minimum cumulative grade point average of 2.25 for all courses attempted and for all courses that count toward graduation requirements, excluding P grades for courses taken Pass/Fail. (Pass/Fail courses do not count for graduation credit.)

3. A minimum cumulative grade point average of 2.25 for all CEAE course work. This "major" grade point average is computed separately from the student's cumulative grade point average and includes only course work from CVEN and AREN.
4. Successful completion of all Minimum Academic Preparation Standards (MAPS) requirements of the College.
5. Successful completion of WRTG 3030, *Writing on Science and Society* or an approved alternate writing course (WRTG 3035, GEEN 3000, or HUEN 3100). Any other exceptions to the WRTG 3030 requirement must be approved via petition by the Dean of Engineering.
6. Take the Fundamentals of Engineering (FE) Examination, fall or spring of the student's senior year (including both the morning general and the afternoon civil, environmental, or other disciplines subject section), is required. Graduation is not contingent upon passing. However, it is beneficial for your career to do so because this exam is the first step toward professional registration.
7. Submission of a completed Application for Diploma Form, on-line.
8. Obtain the recommendation of the CEAE faculty.
9. Obtain the recommendation of the faculty of the College of Engineering and Applied Science.

Note: Double degree students must obtain approval of both designated departments and colleges. The University normally requires that a minimum of an additional 30 semester credit hours be earned for the second degree outside of engineering or 15 credits for a second degree within engineering. However, BOTH degree requirements must be completed. Minor students must provide Engineering Dean's Office with a Minor Completion form to verify minor requirements have been completed.

BECAUSE THE **BURDEN OF PROOF** IS ON THE STUDENT, CONSULT THE ASSOCIATE CHAIR FOR UNDERGRADUATE PROGRAMS, YOUR FACULTY ADVISOR, OR THE UNDERGRADUATE COORDINATOR, AND PETITION FOR APPROVAL OF **ANY** PROGRAM DEVIATIONS.

AREN Technical Elective Requirements

A technical elective is generally a course in engineering or science with technical content, selected in consultation with a faculty advisor at the upper (3000+) level. Courses listed as Concentrations in this guide are examples of technical electives. Up to 3 credit hours of Independent Study, Undergraduate Research, or the following ROTC courses are acceptable as technical elective credit: AIRR 3010 or NAVR 4010. A maximum of 6 credit hours of technical electives other than CVEN or AREN courses may be selected with the consent of the student's faculty advisor.

AREN Free Elective Requirements

A free elective is generally any college-level course. Free electives cannot be fulfilled with AP or IB credit, and cannot be similar to courses used toward graduation requirements or deficiencies (i.e. Trigonometry, non-calculus-based physics, etc. may not be used).

Engineering Science Track

For those students who have advanced placement credits, seek additional career opportunities in research and development in engineering and technology, or better preparation for advanced degrees in engineering, they should consider the Engineering Science Track which aims to provide a higher-level preparation in analytical and computer modeling essential in modern engineering and technology. Interested students should contact Prof. Ronald Pak (pak@colorado.edu) or visit the CEAE website.

Additional Educational Opportunities

Independent Study and Undergraduate Research

Undergraduates can participate in ongoing research through independent study projects, the Undergraduate Research Opportunities Program (UROP), and as research assistants for sponsored projects. These opportunities promote individual contact with faculty and graduate students, and they provide an educational experience that cannot be obtained in the normal classroom setting.

Up to three (3) semester credit hours of Independent Study is acceptable for Technical Electives.

An Independent Study is normally supervised by a CEAE faculty member. An approved Independent Study supervised by a faculty member outside of CEAE may also be applied to curriculum requirements as an out-of-department technical elective.

To pursue an independent study, an Independent Study Agreement Form must be completed and signed by both the student and the sponsor of the Independent Study or Undergraduate Research (which includes a written Statement of Work). These forms are available through the College of Engineering Advising Guide http://engineering.colorado.edu/students/advising.htm or the CEAE Undergraduate Coordinator.

Concurrent BS/MS Program

AREN students who plan to continue their education to obtain a graduate degree after completing the requirements for their BS will usually find it advantageous to apply for admission to the concurrent BS/MS degree program. This program allows students who qualify (a 3.25 cumulative GPA is required) to plan a graduate program from the beginning of their junior year rather than from their first year of graduate study. Up to six credit hours of appropriate 5000 level technical elective courses may be applied to the MS degree, subject to GPA restriction. Interested students should discuss this option with their faculty advisor and obtain additional information from the Undergraduate Coordinator or Graduate Coordinator.

The tuition rate for students in this program will be at the undergraduate rate unless the student converts to graduate status after completing the BS requirements.

Undergraduate Research Experience

The Department of Civil, Environmental, and Architectural Engineering of the University of Colorado Boulder is a major research center in the U.S. Most of the CEAE faculty members are active researchers in their field, leading interesting and challenging research projects supported by the government and industry. Students are encouraged to take advantage of such an inquisitive setting to enhance their educational experience by exploring early their ability in guided or independent research. Undergraduate research assistantships are available during the academic year and the summer semester from individual faculty, the College of Engineering, as well as campus's UROP program. Those in the Engineering Science Track are particularly encouraged to participate in such undergraduate research activities.

Discovery Learning Apprenticeships

As a way to encourage undergraduate students to experience research, the College invites applications annually for a number of a Discovery Learning Apprenticeships. Students can earn an hourly wage while engaging in research with college faculty and graduate students. Positions are announced in April for the following fall term and spring term. Students must apply and selection for positions is competitive. For more information, an application and a list of current discovery learning projects, visit http://engineering.colorado.edu/activelearning/discovery.htm.

Double Degrees

It is possible to obtain double degrees in two engineering disciplines or one degree in engineering and a second degree from a department in another college or school of the University. Students must satisfy curricula for both programs and normally complete a minimum of 30 additional semester credit hours above and beyond the degree with the larger minimum credit hour requirement. If the student can satisfy both degree requirements with fewer than 30 additional hours, the difference can be made up with free electives. If both bachelor's degrees are in the College of Engineering and Applied Science, a minimum of 143 credits are required (128 + 15).

Of the 30 additional semester credit hours, regular double degree students must complete 24 semester credit hours in courses offered by the secondary academic department or in courses approved in advance by the department as substitutes. Transfer students pursuing double degrees must complete a minimum of 75 semester credit hours as a degree student in the College of Engineering and Applied Science and must satisfy all other stipulations regarding total hours required and approval of all coursework by both departments concerned.

Students may coordinate their double degree schedule by closely interacting with academic advisors in each of the departments involved. It is in the student's best interest to select courses that satisfy degree requirements in both departments as frequently as possible. In some cases, it may be preferable to pursue an MS degree rather than two undergraduate degrees.

Minors

Numerous minor opportunities exist that would satisfy humanities/social science electives, technical electives, and/or free electives. Many require no additional course work beyond the minimum BS requirements. For more information on minor opportunities and requirements, visit: http://advising.colorado.edu/students/current-students/majors-and-minors-available-to-as-students and http://www.colorado.edu/engineering/academics/degrees-minors-certificates.

Semester at Sea

Administered through the Office of International Education, and managed by the University of Pittsburgh's Institute for Shipboard Education, students explore and learn valuable insights into the various societies visited, allowing students to analyze and discuss their observations in formal classes on the shipboard campus. Set sail aboard the SS Universe Explorer each semester and summers. Contact the Office of International Education for more information, Center for Community (C4C) Suite S355, (303) 492-7741.

Study Abroad

Study abroad, usually taken in the junior year, can be an enriching experience. Information about this unique opportunity can be obtained from the University Study Abroad Office, Center for Community (C4C) Suite S355, (303) 492-7741. The purpose of these guidelines is to assist the student and his or her faculty advisor in planning the courses to take overseas. Many liberal arts courses taken abroad will satisfy the requirements for electives in the humanities and social sciences. Some courses taken abroad may count as technical electives. To guarantee that the courses taken abroad will count toward the AREN degree, the planned program must be approved by your faculty advisor and the Transfer Credit Evaluator.

Student Societies

Students have excellent opportunities to become involved in discipline-related activities outside of the classroom. The Department has active chapters in a number of major student societies including American Society of Civil Engineers (ASCE), American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Associated General Contractors (AGC), Illumination Engineering Society (IES), and Engineers without Borders (EWB-CU).

CEAE Policy on Academic Integrity

The Department of Civil, Environmental, and Architectural Engineering (CEAE) requires all students to adhere to a strict policy of academic integrity. These expectations are in accordance with the University of Colorado Boulder Honor Code (http://www.colorado.edu/honorcode/), but this policy is intended to provide more specific guidelines for all undergraduate and graduate students in CEAE. Ethical behavior in college sets the stage for a lifetime of professional and ethical behavior that is expected of all engineering professionals. This policy describes the academic sanctions that will be imposed by CEAE faculty members. Faculty retain the right to set academic sanctions, and if they choose individual courses can deviate from the expectations stated below; these changes will be noted in the course syllabus. All incidents of academic misconduct will be reported to the Honor Code Council. Non-academic sanctions are the purview of the Honor Code Council.

Any activity that could give you an unfair advantage over other students may be cheating. Specific examples of actions that are considered to be cheating and therefore violations of academic integrity:

- Plagiarizing a homework, lab report, or problem set. On assignments that require you to use supplemental materials, you must properly document the sources of information that you used. If you are uncertain about allowable reference materials or how to document your sources, ask your instructor in advance. Specific examples of plagiarism include:
    - copying from a solution manual
    - copying from Internet sites
    - copying from previous semester's homework set or lab report
    - copying directly from classmates
    - copying lab data that you yourself did not participate in collecting
- Plagiarizing content in a paper, report, thesis, or dissertation, by copying material from a published sources or the internet, without appropriate citation format and attribution
- Using unapproved information during a closed-book test or quiz (such as a reference sheet, information stored in a calculator, iPhone, information written on your skin)
- Copying from another student during a quiz, exam, or test
- Working in groups on web based quizzes, exams, or tests

- Working in groups on take-home quizzes, exams, or tests
- Asking another student about questions on an exam that you have not yet taken
- Changing the answer on your test/homework after it was graded and then telling the instructor that there was a grading mistake
- Allowing another student to copy your homework, lab report, or allowing another student to look at your answers during a quiz or exam
- The list above is not exhaustive; other violations are possible

Any violation will be reported to the Honor Code Council.

Any first violation of academic integrity on graded course activities (i.e. homework, lab reports, exams) will result in a minimum sanction of a zero score and an entry in your department file. Instructors can increase these penalties to assigning a failing grade (F) for the entire course. The department will retain a list of all instances of academic integrity violations. Additional sanctions will be imposed for subsequent violations.

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AREN Block Diagram

Sem	CR						
8	17	TECHNICAL ELECTIVE-3	TECHNICAL ELECTIVE-3		**AREN 4317-5 #** AREN Design (ARCH 4010**)	**ARCH 3214-3** History & Theories of Architecture II	**SOC-HUM** Elective-3
7	17	**Concentration II OR Tech Elective*** AREN XXXX-3 or CVEN XXXX-3	TECHNICAL ELECTIVE-3		**ARCH 4010-5 #** Arch. Design (Open to AREN SR's only)	**ARCH 3114-3** History & Theories of Architecture I	**SOC-HUM** Elective-3
6	15	**Concentration I** AREN XXXX-3 or CVEN XXXX-3	TECHNICAL ELECTIVE-3	**CVEN 4545-3 or CVEN 4555-3 ***** Structural Design (CVEN 3525) **OR** **AREN 4420-3 #** Cost Engineering (CVEN 3246) **OR** **AREN 4110-3 #** HVAC Design (AREN 3010) **OR** **AREN 4570-3 #** Electrical Systems (ECEN 3030)		**CVEN 4545/4555** OR **AREN 4420-3** OR **AREN 4110-3** OR **AREN 4570-3**	**WRTG 3030-3** Writing on Sci./Soc. (Jr. standing) OR **SOC-HUM**
5	15		**AREN 3540-3 #** Illumination 1 (GEEN 1300)	**AREN 3010-3 #** Mech. Systems Bldgs. (AREN 2050, 2110, 2120)	**ECEN 3030-3 #** Electrical Circuits (APPM 2360)	**CVEN 3525-3** Structural Analysis (CVEN 3161)	**CVEN 3246-3** Introduction to Construction (Jr. standing or instr. consent)
4	16	**APPM 2360-4** Introduction to Linear Algebra & Differential Equations (APPM 1360 or MATH 2300)	**GEEN 1300-3** Engineering Computing	**AREN 2120-3 #** Fluid Mech. & Heat Transfer (APPM 2350, AREN 2110, co-req. APPM 2360)		**CVEN 3161-3** Mechanics of Materials I (CVEN 2121, co-req. APPM 2360)	**FREE ELECTIVE-3**
3	17	**APPM 2350-4** Calculus III for Engineers (APPM 1360 or MATH 2300)	**PHYS 1120-4** (PHYS 1110, co-req. MATH 2300 or APPM 1360)	**AREN 2110-3 #** Thermodynamics (PHYS 1110, co-req. APPM 1360)	**AREN 2050-3 #** Building Materials and Systems (AREN 1027)	**CVEN 2121-3** Analytical Mechanics I (PHYS 1110, co-req. APPM 2350)	
2	17	**APPM 1360-4** Calculus II for Engineers (APPM 1350 or MATH 1300)	**PHYS 1110-4** Gen. Physics I (co-req. APPM 1350 or MATH 1300)		**CVEN 2012-3** Introduction to Geomatics (APPM 1350 or equiv.)	**GEEN 1400-3** Engrg. Projects OR **GEEN 1410-3** Social Innovation and Design	**SOC-HUM-3** OR **HUEN 1010** Writing Elective
1	14	**APPM 1350-4** Calculus I for Engineers (2 yr. HS alg., 1yr geom., ½ yr. trig.; or approval by faculty advisor)	**CHEN 1211-3** Gen. Chem. for Engineers**** (1 yr. HS chem. or CHEM 1021, HS alg., co-req. CHEM 1221)	**CHEM 1221-2** General Chemistry Lab for Engineers	**GEEN 1500-2 #** Introduction to Engineering OR **AREN 1316/CVEN 1317**	**AREN 1027-3** Engineering Drawing OR **AREN 1037**	

Fall 2012

**Course is offered only in the semester shown (fall or spring)**
( ) **Prerequisite and co-requisite requirements for course listed**
***** **Requirements may vary by concentration**
****** **Other prerequisites: AREN 3010, AREN 3540, CVEN 3246, CVEN 3525**
******* **CVEN 4545 offered spring semester only; CVEN 4555 offered fall semester only**
******** **CHEN 1211 and CHEM 1221 must be taken concurrently**

AREN Block Diagram – Engineering Science Option

Sem	CR						
8	17	TECHNICAL ELECTIVE-3	**APPM 4120-3** Ops. Research **OR** **CVEN 4537-3** Num. Methods		**AREN 4317-5 #** AREN Design (ARCH 4010**)	**ARCH 3214-3** History & Theories of Architecture II	**SOC-HUM** Elective-3
7	17	**Concentration II OR Tech Elective*** AREN XXXX-3 or CVEN XXXX-3	**APPM 4350-3** Methods in Applied Math or equivalent		**ARCH 4010-5 #** Arch. Design (Open to AREN SR's only)	**ARCH 3114-3** History & Theories of Architecture I	**SOC-HUM** Elective-3
6	15	**Concentration I** AREN XXXX-3 or CVEN XXXX-3	TECHNICAL ELECTIVE-3	**CVEN 4545-3 or CVEN 4555-3 ***** Structural Design (CVEN 3525) **OR** **AREN 4420-3 #** Cost Engineering (CVEN 3246) **OR** **AREN 4110-3 #** HVAC Design (AREN 3010) **OR** **AREN 4570-3 #** Electrical Systems (ECEN 3030)		**CVEN 4545/4555** OR **AREN 4420-3** OR **AREN 4110-3** OR **AREN 4570-3**	**WRTG 3030-3** Writing on Sci./Soc. (Jr. standing) OR **SOC-HUM**
5	15		**AREN 3540-3 #** Illumination 1 (GEEN 1300)	**AREN 3010-3 #** Mech. Systems Bldgs. (AREN 2050, 2110, 2120)	**ECEN 3030-3 #** Electrical Circuits (APPM 2360)	**CVEN 3525-3** Structural Analysis (CVEN 3161)	**CVEN 3246-3** Introduction to Construction (Jr. standing or instr. consent)
4	16	**APPM 2360-4** Introduction to Linear Algebra & Differential Equations (APPM 1360 or MATH 2300)	**GEEN 1300-3** Engineering Computing	**AREN 2120-3 #** Fluid Mech. & Heat Transfer (APPM 2350, AREN 2110, co-req. APPM 2360)		**CVEN 3161-3** Mechanics of Materials I (CVEN 2121, co-req. APPM 2360)	**FREE ELECTIVE-3**
3	17	**APPM 2350-4** Calculus III for Engineers (APPM 1360 or MATH 2300)	**PHYS 1120-4** (PHYS 1110, co-req. MATH 2300 or APPM 1360)	**AREN 2110-3 #** Thermodynamics (PHYS 1110, co-req. APPM 1360)	**AREN 2050-3 #** Building Materials and Systems (AREN 1027)	**CVEN 2121-3** Analytical Mechanics I (PHYS 1110, co-req. APPM 2350)	
2	17	**APPM 1360-4** Calculus II for Engineers (APPM 1350 or MATH 1300)	**PHYS 1110-4** Gen. Physics I (co-req. APPM 1350 or MATH 1300)		**CVEN 2012-3** Introduction to Geomatics (APPM 1350 or equiv.)	**GEEN 1400-3** Engrg. Projects OR **GEEN 1410-3** Social Innovation and Design	**SOC-HUM-3** OR **HUEN 1010** Writing Elective
1	14	**APPM 1350-4** Calculus I for Engineers (2 yr. HS alg., 1yr geom., ½ yr. trig.; or approval by faculty advisor)	**CHEN 1211-3** Gen. Chem. for Engineers**** (1 yr. HS chem. or CHEM 1021, HS alg., co-req. CHEM 1221)	**CHEM 1221-2** General Chemistry Lab for Engineers	**GEEN 1500-2 #** Introduction to Engineering OR **AREN 1316/CVEN 1317**	**AREN 1027-3** Engineering Drawing OR **AREN 1037**	

**Course is offered only in the semester shown (fall or spring)**
( ) **Prerequisite and co-requisite requirements for course listed**
***** **Requirements may vary by concentration**
****** **Other prerequisites: AREN 3010, AREN 3540, CVEN 3246, CVEN 3525**
******* **CVEN 4545 offered spring semester only; CVEN 4555 offered fall semester only**
******** **CHEN 1211 and CHEM 1221 must be taken concurrently**

ARCHITECTURAL ENGINEERING CONCENTRATIONS

STRUCTURAL SYSTEMS

Fundamental – CVEN 3525 Structural Analysis
Proficiency – CVEN 4545 Steel Design **or** CVEN 4555 Reinforced Concrete
Concentration – TBA for 2013-2014 catalog

MECHANICAL SYSTEMS

Fundamental – AREN 3010 Mechanical Systems for Buildings
Proficiency – AREN 4110 HVAC Design
Concentration – TBA for 2013-2014 catalog

ELECTRICAL/LIGHTING SYSTEMS

Fundamental – ECEN 3030 Electrical Circuits and AREN 3540 Illumination I
Proficiency – AREN 4570 Electrical Systems
Concentration – TBA for 2013-2014 catalog

CONSTRUCTION ENGINEERING AND MANAGEMENT

Fundamental – CVEN 3246 Introduction to Construction
Proficiency – AREN 4420 Cost Engineering
Concentration – TBA for 2013-2014 catalog

GRADUATION PLANNER **ARCHITECTURAL ENGINEERING** **FALL 2012**

Student _____
SID # _____

ADVISOR _____
Transfer credits approved by: _____

Expected date of graduation: _____

Mathematics (16)
APPM 1350-4 _____
APPM 1360-4 _____
APPM 2350-4 _____
APPM 2360-4 _____

Basic Science (13)

CHEN 1211-3 _____
CHEM 1221-2 _____
PHYS 1110-4 _____
PHYS 1120-4 _____

Basic Engineering Elective (3)
GEEN 1400 _____

NOTE: *A maximum of 6 hours of technical electives may be taken outside the department , with advisor approval.*

Core Courses (51)
AREN 1316-2 _____
AREN 1027-3 _____
AREN 2110-3 _____
AREN 2120-3 _____
AREN 2050-3 _____
GEEN 1300-3 _____
AREN 3540-3 _____
AREN 3010-3_____
AREN 4317-5 _____
ECEN 3030-3 _____
ARCH 4010-5 _____
CVEN 2012-3 _____
CVEN 2121-3 _____
CVEN 3161-3 _____
CVEN 3246-3 _____
CVEN 3525-3_____

Proficiency (6)
Take 2 of the 5 courses
CVEN 4545-3_____
CVEN 4555-3_____
AREN 4420-3_____
AREN 4110-3_____
AREN 4570-3_____

Humanities & Social Sciences (9)
ARCH 3114-3 _____
ARCH 3214-3 _____
WRTG 3030-3 _____

H&SS Electives (9 credits)
_____
_____
_____

Free Elective (3 credits)
_____

Concentrations (6 credits)
Circle Selection:
Const Struct Mech E/L
_____
_____

Technical Electives (12 credits)
_____
_____
_____
_____

ACTUAL CREDITS:

Total M. & B.S. _____ **Total Core Courses _____** **Total H-S _____** **Total Tech. _____ = 128 hrs.**

GRADUATION PLANNER **FALL 2012**

ARCHITECTURAL ENGINEERING

Engineering Science Option

Student _____ **ADVISOR _____** Expected date of graduation:

SID # _____ Transfer credits approved by: _____ _____

Mathematics (16)

APPM 1350-4 _____
APPM 1360-4 _____
APPM 2350-4 _____
APPM 2360-4 _____

Basic Science (13)

CHEN 1211-3 _____
CHEM 1221-2 _____
PHYS 1110-4 _____
PHYS 1120-4 _____

Basic Engineering Elective (3)

GEEN 1400 _____

NOTE: *A maximum of 6 hours of technical electives may be taken outside the department , with advisor approval.*

Core Courses (51)

AREN 1316-2 _____
AREN 1027-3 _____
AREN 2110-3 _____
AREN 2120-3 _____
AREN 2050-3 _____
GEEN 1300-3 _____
AREN 3540-3 _____
AREN 3010-3_____
AREN 4317-5 _____
ECEN 3030-3 _____
ARCH 4010-5 _____
CVEN 2012-3 _____
CVEN 2121-3 _____
CVEN 3161-3 _____
CVEN 3246-3 _____
CVEN 3525-3_____

Proficiency (6)

Take 2 of the 5 courses

CVEN 4545-3_____
CVEN 4555-3_____
AREN 4420-3_____
AREN 4110-3_____
AREN 4570-3_____

Humanities & Social Sciences (9)

ARCH 3114-3 _____
ARCH 3214-3 _____
WRTG 3030-3 _____

H&SS Electives (9)

_____
_____
_____

Free Elective (3)

_____

Concentration (6)

Circle Selection:

Const Struct Mech E/L

_____
_____

Technical Electives (9)

_____
_____
_____

Engineering Science (6)

APPM 4350-3 _____
APPM 4120-3 or CVEN 4537-3
_____

ACTUAL CREDITS:

Total M. & B.S. _____ **Total Core Courses _____** **Total H-S _____** **Total Tech. _____ = 128 hrs.**