## FRESHMAN YEAR

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<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td>MATH 1401</td>
<td>Anal. Geo. &amp; Calculus I</td>
<td>MATH 2411</td>
</tr>
<tr>
<td>CHEM 1130</td>
<td>General Chemistry</td>
<td>PHYS 2311/2321</td>
</tr>
<tr>
<td>ELEC 1201*</td>
<td>Intro. to Electrical Engr.</td>
<td>ELEC 1520</td>
</tr>
<tr>
<td>ELEC 1510</td>
<td>Logic Design</td>
<td>ELEC 2531</td>
</tr>
<tr>
<td>ENGL 1020</td>
<td>Core Composition I</td>
<td>Core Curriculum Course (see sec. X)</td>
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### SOPHOMORE YEAR

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<tbody>
<tr>
<td>MATH 2421</td>
<td>Cal. &amp; Anal. Geo. III</td>
<td>ELEC 2142</td>
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<tr>
<td>MATH 3195</td>
<td>Linear Alg. &amp; Diff. Eq.</td>
<td>ELEC 2552</td>
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<tr>
<td>PHYS 2331</td>
<td>Gen. Physics II</td>
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<tr>
<td>ELEC 2132</td>
<td>Circuits Analysis I</td>
<td>Core Curriculum Course (see sec. X)</td>
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<tr>
<td>ENGL 2030</td>
<td>Core Composition II</td>
<td>Core Curriculum Course (see sec. X)</td>
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### JUNIOR YEAR

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<tbody>
<tr>
<td>ELEC 3133</td>
<td>Electromagnetic Fields</td>
<td>ELEC 3164</td>
</tr>
<tr>
<td>ELEC 3215</td>
<td>Electronics I</td>
<td>ELEC 3225</td>
</tr>
<tr>
<td>ELEC 3316</td>
<td>Linear Systems</td>
<td>ELEC 3735</td>
</tr>
<tr>
<td>ELEC 3715</td>
<td>Electronics Lab</td>
<td>ELEC 3724</td>
</tr>
<tr>
<td>ELEC 3651</td>
<td>Digital Hardware Design</td>
<td>ELEC 3817</td>
</tr>
<tr>
<td>ENGR 3400</td>
<td>Technology and Culture</td>
<td>Professional Elective (see sec, IX)</td>
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<td>Core Curriculum Course (see sec. X)</td>
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### SENIOR YEAR

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<tbody>
<tr>
<td>ELEC 4309</td>
<td>Senior Design Project I</td>
<td>ELEC 4319</td>
</tr>
<tr>
<td>ENGR Science Elective</td>
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<td>Core Curriculum Course (see sec. X)</td>
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<tr>
<td>ELEC Specialty (see sec. VIII)</td>
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<td>ELEC Specialty &amp; Lab (see sec. VIII)</td>
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<td>ELEC Specialty (see sec. VIII)</td>
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<td>ELEC Specialty (see sec. VIII)</td>
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<tr>
<td>ELEC Specialty &amp; Lab (see sec. VIII)</td>
<td>4</td>
<td>Professional Elective (see sec. IX)</td>
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### Notes

- **For transfer students, any ELEC class or lab may be substituted for ELEC 1201.**

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*Program Guide Fall 2013*
BSEE Curriculum: Effective Fall 2008
Each Student MUST follow the rules of the ELEC Department as outlined.

I  Intellectual Competencies (6 semester hours) (see p. 4)
   ENGL 1020-3  Core Composition I
   ENGL 2030-3  Core Composition II

II  Common Core Courses (18 semester hours) (see p. 4)
   SOCIAL SCIENCES: one course
   BEHAVIORAL SCIENCES: one course
   HUMANITIES: one course
   ARTS: one course
   CULTURAL DIVERSITY: one course
   INTERNATIONAL PERSPECTIVES: one course

III  Mathematics (19 semester hours)
    MATH 1401-4  Analytical Geometry and Calculus I
    MATH 2411-4  Analytical Geometry and Calculus II
    MATH 2421-4  Calculus and Analytical Geometry III
    MATH 3195-4  Linear Algebra & Differential Equations
    ELEC 3817-3  Engineering Probability & Statistics

IV  Basic Science (14 semester hours)
    PHYS 2311-4  General Physics I
    PHYS 2321-1  General Physics Lab I
    PHYS 2331-4  General Physics II
    CHEM 1130-5  Engineering General Chemistry

V  Engineering Science Elective (3 semester hours)
    ENGR 3012-3  Thermodynamics

    Or approved Engineering Science special topics course such as: Quantum Electronics (ELEC 4678) and Renewable Energy (ELEC 4755).

VI  Electrical Engineering Required Courses (39 semester hours)
    ELEC 1201-1  Introduction to Electrical Engineering
    ELEC 1510-3  Logic Design
    ELEC 1520-3  Embedded Systems I
    ELEC 2132-3  Circuit Analysis I
    ELEC 2142-3  Circuit Analysis II
    ELEC 2520-3  Embedded Systems II
    ELEC 2531-1  Logic Laboratory
    ELEC 2552-1  Sophomore Circuits Laboratory

    ELEC 3133-3  Electromagnetic Fields
    ELEC 3164-3  Energy Conversion
    ELEC 3215-3  Electronics I
    ELEC 3225-3  Electronics II
    ELEC 3316-3  Linear Systems
    ELEC 3651-3  Digital Hardware Design
    ELEC 3715-1  Electronics Laboratory
    ELEC 3724-1  Energy Conversion Lab
    ELEC 3735-1  Junior Laboratory

VII  Electrical Engineering Required Senior Design Sequence (6 Semester Hours)
    ELEC 4309-3  Senior Design Project I
    ELEC 4319-3  Senior Design Project II

Program Guide Fall 2013
Elec Elective and Specialty Courses in Association with Design Laboratory (17 semester hours):

Students are required to take at least two (2) laboratories out of the following six (6) groups. Theory components are either pre-requisites or co-requisites to the laboratory components. These courses will be staggered, and will not be offered every semester. Depending on the enrollment, the laboratory courses may be offered more frequently. The “Theory Component” (without the laboratory) may be taken as the “Specialty” courses. Additionally, ELEC graduate level courses have been approved as “Specialty” courses. In all cases, “Specialty” courses must be ELEC courses at the four thousand level or higher. These classes typically may not be transferred in from other institutions. Any requests for exception to this must be petitioned (see section XI, part 6). All students must take at least one ELEC specialty class from three of the following (6) areas.

<table>
<thead>
<tr>
<th>Control Systems</th>
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<tbody>
<tr>
<td>ELEC 4136-3  Control Systems Analysis</td>
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<tr>
<td>ELEC 4276-3  Digital Control Systems</td>
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<tr>
<td>ELEC 4466-3  Adaptive Control System Design</td>
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<td><strong>ELEC 4406-1  Control Systems Laboratory</strong></td>
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<tr>
<th>Micro-electronics</th>
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<tbody>
<tr>
<td>ELEC 4005-3  IC Design</td>
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<td>ELEC 4025-3  Device Electronics</td>
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<tr>
<td>ELEC 4225-3  Electronics III</td>
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<tr>
<td>ELEC 4555-3  VLSI Circuit Simulation</td>
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<tr>
<td><strong>ELEC 4435-1  Advanced Electronics Laboratory</strong></td>
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<tr>
<th>Communications</th>
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<tr>
<td>ELEC 4247-3  Communication Theory</td>
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<tr>
<td>ELEC 4248-3  Digital Communication Systems</td>
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<tr>
<td><strong>ELEC 4467-1  Communications Laboratory</strong></td>
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<thead>
<tr>
<th>Electromagnetic Fields and Waves</th>
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<tbody>
<tr>
<td>ELEC 4133-3  Advanced Electromagnetic Fields</td>
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<tr>
<td>ELEC 4373-3  Optical Engineering</td>
</tr>
<tr>
<td>ELEC 4644-3  Introduction to Biomedical Imaging</td>
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<tr>
<td>ELEC 4678-3  Quantum Electronics</td>
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<td>ELEC 4688-3  Introduction to Nondestructive Testing</td>
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<td><strong>ELEC 4423-1  Microwave Laboratory</strong></td>
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<tr>
<th>Computer Engineering</th>
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<tbody>
<tr>
<td>ELEC 4501-3  Microprocessor-based Design</td>
</tr>
<tr>
<td><strong>ELEC 4521-1  Microprocessor-based Laboratory</strong></td>
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<tr>
<td>ELEC 4511-3  Hardware-Software Interface Design</td>
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<tr>
<td><strong>ELEC 4561-1  Hardware-Software Laboratory</strong></td>
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<td>ELEC 4723  High Performance Computer Architecture</td>
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<tr>
<th>Power Systems</th>
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<tbody>
<tr>
<td>ELEC 4184-3  Power Systems Analysis</td>
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</table>
**IX. PROFESSIONAL ELECTIVES (6 SEMESTER HOURS):**

A professional elective may be any additional ELEC specialty course or an upper division class that would be beneficial to an engineering career. Classes that fit this description would include any ELEC (4) thousand level lecture class, cooperative education (ELEC 3939) and all graduate level ELEC classes. See your advisor for details.

Other courses may satisfy the Professional Elective requirement, but check with your advisor as non-ELEC courses require departmental approval. **Only one professional elective can be taken as a non-ELEC course.**

**X. UNIVERSITY OF COLORADO DENVER COLLEGE OF ENGINEERING AND APPLIED SCIENCE**

**Common Core Curriculum Requirements**

Students graduating from the College of Engineering and Applied Science are required to satisfy the humanities and social science and writing portions of their Engineering program (a minimum of 24 hrs.) by taking the following courses from the UC Denver common core curriculum:

**Exceptions to the above are possible; however, such requests must be made by petition in advance.**

**3 HOURS OF SOCIAL SCIENCES:**

One (1) course from:

- ENVS 1342-3. Introduction to Environment and Society
- ETST 2000-3. Introduction to Ethnic Studies
- GEOG 1102-3. World Regional Geography
- GEOG 1602-3. Introduction to Urban Studies

**3 HOURS OF CULTURAL DIVERSITY:**

One (1) course from:

- ANTH 3142-3. Cultural Diversity in the Modern World
- COMM 3271-3. Communication and Diversity
- ECON 3100-3. Economics of Race and Gender
- ENGL 3795-3. Race and Ethnicity in American Literature
- ENGR 3400-3. Technology and Culture-
GEOG 2202-3. Natural Hazards  
HBSC 2001-3. Intro to Community and Population Health Science  
PSCI 1001-3. Intro to Political Science: Quest for Freedom to Justice  
PSCI 1101-3. American Political System  
SJUS 2000-3 Democratic Participation – Social Justice  
SOCY 1001-3. Introduction to Sociology  
SOCY 2462-3. Introduction to Social Psychology

**3 HOURS OF HUMANITIES:**
One (1) course from:

- CNST 1000-3. China and the Chinese  
- ENGL 1601-3. Telling Tales: Narrative Art in Literature and Film  
- ENGL 2600-3. Great Works in British & American Literature  
- ETST 2155-3. African American History  
- FREN 1000-3. Intro to Cultures of the French-Speaking World  
- GRMN 1000-3. Germany and the Germans  
- HIST 1361-3. U.S. History to 1876  
- HIST 1362-3. U.S. History since 1876  
- HIST 1381-3. Paths to the Present I  
- HIST 1382-3. Paths to the Present II  
- PHIL 1012-3. Intro to Philosophy: Relationship of Individual to World  
- PHIL 1020-3. Introduction to Ethics & Society: Person & Community  
- PHIL 2441-3. Logic and Language  
- RLST 1610-3. Introduction to Religious Studies  
- RLST 2660-3. World Religions  
- SPAN 1000-3. Intro to Cultures of the Spanish-Speaking World

**3 HOURS OF BEHAVIORAL SCIENCES:**
One (1) course from:

- ANTH 1302-4. Introduction to Archaeology  
- ANTH 2102-3. Culture and the Human Experience  
- COMM 1011-3. Fundamentals of Communication  
- COMM 1021-3. Fundamentals of Mass Communication  
- PSYC 1000-3. Introduction to Psychology I

**Required**

ETST 3704-3. Culture, Racism and Alienation  
ETST 3794-3. Ethnic Diversity in American Literature  
HIST 3345-3. Immigration and Ethnicity in U.S. History  
HIST 3349-3. Social Movements in 20th Century America  
MGMT 4100-3. Managing Cultural Diversity  
PHIL 3500-3. Ideology and Culture: Racism and Sexism  
PSCI 3034-3. Race, Gender, Law and Public Policy  
PSCI 3035-3. Political Movement: Race and Gender  
PSYC 4485-3. Psychology of Cultural Diversity  
RLST 4000-3. Religion and Cultural Diversity  
SOCY 3020-3. Race and Ethnicity in the U.S.  
THTR 3611-3. Drama of Diversity

**3 HOURS OF INTERNATIONAL PERSPECTIVES:**
One (1) course from:

- ENGL 3798-3. International Perspectives in Literature and Film  
- ENGR 3600-3. International Dimensions of Culture & Technology  
- FREN 3200-3. The Francophone World in the Post-Colonial Era  
- GRMN 3200-3. Current German Society and Culture  
- HIST 3121-3. World at War, 1914-1945  
- HIST 4032-3. Globalization in World History Since 1945  
- INTB 3000-3. Global Perspectives  
- PSCI 3022-3. Introduction to Comparative Politics  
- PSCI 3042-3. Introduction to International Relations

**6 HOURS OF INTELLECTUAL COMPETENCIES:**

- ENGL 1020-3. Core Composition I  
- ENGL 1030-3. Core Composition II
Students graduating from the College of Engineering and Applied Science are required to satisfy the humanities and social science and writing portions of their Engineering program (a minimum of 24 hrs.) by taking the following courses from the UC Denver common core curriculum:

Exceptions to the above are possible; however, such requests must be made by petition in advance.

XI. STUDENT GUIDELINES

1) **REGULAR VISITS WITH FACULTY ADVISOR** - Students must meet with their faculty advisor prior to every semester to check pre-requisite requirements for courses that they plan to take. In addition, the advisor checks to see that everything is “on track” with regard to satisfactory progress towards the BSEE degree. Most persons do seek employment during and/or after their schooling, and references are customarily a part of job applications. Thus, it is in a student’s best interest that he/she gets to know his/her faculty advisor(s) and other faculty members well enough that they can serve as references in the future.

2) **CURRICULUM CHANGES** - Students should obtain a copy of the latest ELEC Advisement Guide from the Electrical Engineering office for any updates and/or changes. Students are expected to follow the curriculum which was published at the date they first enrolled at UC Denver.

3) **ADVISING FOR TRANSFER OF CREDITS INTO ELEC PROGRAM** – There are two levels of transfer advising are available.

   A) INFORMAL transfer advising is done on an ad-hoc basis using unofficial transcripts, catalogs, and so forth.

   B) FORMAL documented transfer advising is done only AFTER the UCD Admissions Office has issued an “Applicant Transfer Credit Evaluation,” and the student has been admitted to the College of Engineering and Applied Science. The formal transfer of credit into the ELEC program must be requested, or initiated, by the student. It is recommended that this should be done as soon as the student has been accepted into the ELEC program. It is the responsibility of the student to see that transfer credits are entered into the UC Denver system. This is done by requesting that transcripts from other institutions are forwarded to the UC Denver office of admissions and records.

PSYC 1005-3. Introduction to Psychology II

**3 HOURS OF ARTS:**
One (1) course from:

FINE 1001-3. Introduction to Art
PMUS 1001-3. Music Appreciation
THTR 1001-3. Introduction to Theatre
Transfer credits can then be evaluated by the appropriate department (i.e. Math credits are evaluated by the math department and so on). Appointments for either form of transfer advising are made through the departmental office.

4) **30-HOUR SENIOR CHECKOUT** - After completing approximately 90 semester hours toward the BSEE degree (junior year of program), each student must request that a 30-hour senior checkout be done by the department. (Should the student have some applicable transfer credits, he/she should first request a FORMAL transfer evaluation (See Item 3).) During the 30-hour senior checkout, the courses needed to complete the student’s study program are specified on the 30-hour checkout form. A 30-hour checkout is only valid for two years. If a student does not graduate during this time period, another checkout must be requested. Appointments for 30-hour checkouts are made through the departmental office.

5) **GRADUATION AGREEMENT** - Prior to the last semester each student must request that a graduation agreement be completed. This agreement specifically states the exact courses that must be satisfactorily completed during the final semester of the student’s program. Appointments for graduation agreements are made through the departmental office.

6) **PRE-APPROVAL OF ANY CURRICULAR DEVIATIONS (OR PETITIONS)** - Any deviation from the approved curriculum must be approved BEFORE taking the course or lab. Approval is obtained via a departmental petition. It is recommended that all petitions be submitted for departmental approval at least four (4) weeks in advance before the “LAST DAY TO REGISTER, DROP OR ADD” that is published in the Schedule of Classes for that semester. Curricular deviations requested after this date will be denied.

7) **REQUIRED GRADES IN PREREQUISITES** - Students are required to successfully complete the courses with a C- (or higher) grade in any pre-requisite course before taking the subsequent course. Students may NOT register for credit in a course in which they already have received a grade of C- or higher. (They may enroll for a “NC” grade only.)

8) **PRE-ENGINEERING STUDENTS IN OTHER COLLEGES** - All potential Electrical Engineering students attending UC Denver should obtain a copy of the latest Electrical Engineering Printed Advisement Guide from the Electrical Engineering Office on a regular basis and should follow its curriculum. (See Item 2.) Students needing additional information may make an appointment to see an advisor through the departmental office.

9) **COURSES RESTRICTED TO EE STUDENTS** – All upper-division ELEC courses are restricted. Thus, it is imperative that students enroll in the College of Engineering and Applied Science as early as possible. Transfer students can enroll in the College of Engineering and Applied Science upon successful completion of ELEC 2132 - Circuits I.
10) **GRADE POINT AVERAGE (GPA) REQUIREMENTS** - To remain in good standing within the College of Engineering and Applied Science, each student must maintain a 2.00 (or greater) cumulative average as calculated in each of the following three ways:

a) All courses attempted within the CU system (overall GPA).

b) All courses that are counted as part of his/her study program.

c) All ELEC courses attempted.

In order to earn a BSEE degree from UC Denver, each student must achieve a 2.00 (or greater) average at the time of graduation as calculated in each of the three ways described above.

11) **ADDITIONAL ELECTRICAL ENGINEERING DEPARTMENT RULES AND POLICIES** – The following additional department rules and policies will take effect beginning in the Fall 2012 term:

a) Once a student has enrolled in the UC Denver College of Engineering and Applied Science, ELEC courses may not be transferred in from outside the CU system. Pooled and core courses may still be transferred as per the statewide articulation agreement except any math courses. Math classes are required to be taken on UCD campus in person.(CEAS Math policy May 9th 2013.)

b) Residency requirement. All of the last 40 ELEC credits (at least) must be taken at UC Denver to earn a BSEE in electrical engineering from UC Denver.

c) Where pre-requisite requirements allow, it is possible that students may simultaneously take ELEC courses from two subsequent years in the program (i.e. ELEC 2142 may be taken co-req. with ELEC 3215). Students may **not** take ELEC classes that span more than two subsequent years (i.e. all ELEC (1) thousand classes must be completed before taking **any** ELEC (3) thousand classes, all ELEC (2) thousand classes must be completed before taking **any** ELEC (4) thousand classes and all ELEC (3) thousand classes must be completed before taking **any** ELEC (5) thousand classes).

d) Pre-requisite violations. Mandatory pre-semester advising is given to all students every semester to ensure that pre-requisite course requirements are understood and adhered to. Students who intentionally attempt to sign up for classes that they do not have the necessary pre-requisites will be administratively dropped and will not receive any tuition refund. Repeat offenders will automatically be assigned a grade of “F” for the course.

e) Independent Study. The independent study course (ELEC 4840) may be used in cases where a student wishes to pursue study in a subject beyond regularly offered courses **and** there is a full time faculty member willing to mentor that student. Independent study must be approved by the faculty sponsor prior to the beginning of the semester. Independent study may not be used as a substitute for a required course.
f) Graduate level courses counted for both BSEE and MSEE requirements. To encourage students to pursue a graduate degree after graduation from UC Denver, up to two ELEC graduate level courses (6 credits) completed with a B or better may be counted toward the BSEE degree and subsequently applied to the MSEE degree. See the Electrical Engineering graduate brochure for graduate school admission requirements.

12) ADDITIONAL COLLEGE RULES AND REGULATIONS - Each student should be aware that there are rules, regulations, and requirements within the College of Engineering and Applied Science, which are published annually in the UCD catalog.

13) TRANSFER CREDIT GUIDELINES – All transfer credit will be evaluated by the department transfer credit advisor. Since every transfer case is unique, the following guidelines are intended to illustrate how the transfer credit process works and not to provide specific rules that apply to all cases. Please note that if transfer credit from outside the state of Colorado is to be used to satisfy ELEC pre-requisites, such transfer credit must be evaluated no later than the week before classes start. In most situations, transfer credits fit into one of the following categories:

a) Transfer of credits from any public Colorado community college. By statewide inter-institutional agreement, all required math, science and lower division humanities may be transferred from any community college. Typically, community college calculus courses are 5 credits, which will satisfy the university requirement of 4 credits per calculus class. The extra credit from the community college is not applicable toward the BSEE degree. All lower division (1 and 2 thousand level) humanities classes may be transferred from community colleges. The upper division requirements (multi-cultural diversity and international perspectives) may not be taken at community colleges.

b) Transfer of engineering credits from an ABET accredited university. In order for technical classes to transfer into the BSEE program at UC Denver, both the credit hour count for the class and the content of the course (catalog description) must match the UC Denver requirement. Since program structures vary between institutions, it is possible that some courses may be not transferable or that only a fraction of credit earned is applicable. (Note that 4 quarter hours translates to 2.7 semester hours.) Both the course content and the credit hour count must be in agreement with the UC Denver BSEE requirements. In all cases, at least the last 40 ELEC credit hours must be completed within the UC Denver EE department to earn a BSEE degree from UC Denver.

c) Transfer of credits from non-ABET accredited or foreign universities. This is the most difficult transfer situation since ABET requires that the department take responsibility for verification of course content. It is often the case that course content from other programs only partially coincides with the UC Denver requirements or that complete documentation is not available. In these cases, students are asked to take at least two UC Denver courses that are equivalent to the highest level courses that were taken elsewhere. This helps to validate the students’ knowledge of the subject and preparation for UC Denver ELEC
courses. In general, students must take at least two ELEC 3xxx courses before enrolling in ELEC 4xxx classes. It may also be appropriate to ask the student to take an informal test to help in the evaluation of knowledge. In all cases, at least the last 40 ELEC credit hours must be completed within the UC Denver EE department to earn a BSEE degree from UC Denver.