Texas A&M University -- College of Engineering -- Department of Computer Science & Engineering
Undergraduate Degree Plan in **Computer Engineering** (CECN)

Valid for Fall 2017 Catalog 140

**COMPUTER SCIENCE**
CSCE 121 (4)
222 (3)
221 (4)
350 (4) [10]
313 (4)
315 (3)
462 (3)
481 (1) [2]
483 (3)

**ELECTRICAL ENGR**
ECEN 248 (4)
214 (4)
314 (3)
325 (4)
454 (3)

**ENGINEERING**
ENGR 111 (2) [3]
112 (2) [3]

**ENGR ELECTIVE**
_____ (3) [9]

**MATH & STAT** [1]
MATH 151 (4) [3]
152 (4) [3]
251 (3)
308 (3)
311 (3)

STAT 211 (3)
*or* ECEN 303

**SCIENCES**
CHEM 107 (3) [3]
117 (1) [3]
PHYS 218 (4) [3]
208 (4) [3]

**COMMUNICATION**
ENGL 104 (3) [3]
ENGL 210 (3)
*or* COMM 205 *or* 243

**AREA ELECTIVES (tracks)**
*Track 1:* _____
_____ (3) [9]
_____ (3) [9]
*Track 2:* _____
_____ (3) [9]
_____ (3) [9]

**AREA ELECTIVE (open)**
_____ (3) [9]

**LANG, PHIL & CULT**
ENGR/ PHIL 482 (3) [7]

**CREATIVE ARTS ELECTIVE**
_____ (3) [5, 6]

**SOC & BEHAV SCI ELECTIVE**
_____ (3) [5, 6]

**AMERICANT HISTORY**
HIST _____ (3) [5, 6]
HIST _____ (3) [5, 6]

**GOVT/POLITICAL SCI**
POLS 206 (3) [8]
POLS 207 (3) [8]

**INTERNATIONAL AND CULTURAL DIVERSITY**
_____ (3) [4]
_____ (3) [4]

**HIGH IMPACT EXPERIENCE**
CSCE 399 (0) [11]

**TOTAL HOURS 128**

NOTES:

1. Courses inside box must be completed with grade of C or better.
2. CSCE 481 should be taken in the student's Junior year.
3. In-major courses that should be taken first.
4. Courses taken for ICD credit may be courses taken to meet another requirement.
5. See http://core.tamu.edu/ for classes.
6. At least two of these classes should also be ICD if possible.
7. Writing intensive section of ENGR 482 required; transfer courses are unlikely to meet this requirement.
8. Additional courses may be approved in the future for this requirement. See core.tamu.edu.
9. Engineering elective list and Area electives list (along with track information) available on our website.
10. CSCE 350 and ECEN 350 are cross-listed so either can be taken.
11. All students are required to complete a high-impact experience. See CSCE advising for information.

**Computer Engineering Area electives**

- Students are required to satisfy 2 depth tracks. Satisfying a track requires completing at least 2 courses from the track's list (see below). Consequently, four of the area elective electives are occupied by depth requirements.
- #A few courses are in multiple tracks-each course can only be used in one place on your degree plan. You cannot use the course in two places.
- The fifth course can be from the sequence list or any approved 300/400 level course in CSCE or ECEN. Consult your advising office to determine if a course is approved.
- Depth tracks are subject to change. Consult your advising office for the current list.

**Depth Tracks**

1. Communications and Networks
    - CSCE 463 (3), Computer Networks
    - CSCE 464 (3), Wireless and Mobile Systems
    - #CSCE 465 (3), Computer and Network Security
    - ECEN 423 (3), Computer and Wireless Networks
    - ECEN 424 (3), Fundamentals of Networking
    - #ECEN 434 (3), Optimization for Electrical and Computer Engineering
    - #ECEN 455 (4), Digital Communications
    - ECEN 478 (3), Wireless Communications
    - MATH 470 (3), Comm. & Cryptography
2. VLSI
    - CSCE 469/ECEN 469 (3), Advanced Computer Architecture
    - ECEN 468 (4), Advanced Logic Design
    - ECEN 474 (4), VLSI Circuit Design
    - ECEN 475 (4), Intro. to VLSI Sys. Design
    - ECEN 326 (4), Electronic Circuits
3. Software Systems
    - CSCE 314 (3), Programming Languages
    - CSCE 410 (3), Advanced OS
    - CSCE 411 (3), Design and Analysis of Algorithms
    - CSCE 431 (3), Software Engineering
    - CSCE 434 (3), Compiler Design
    - CSCE 435 (3), Parallel Computing
    - CSCE 442 (3), Scientific Programming
    - CSCE 451 (3), Software Reverse Engineering
    - #CSCE 465 (3), Computer and Network Security
    - CSCE 469/ECEN 469 (3), Advanced Computer Architecture
    - #ECEN 434 (3), Optimization for Electrical and Computer Engineering
4. Signal/Image Processing & Graphics
    - CSCE 441 (3), Computer Graphics
    - CSCE 443 (3), Game Development
    - ECEN 444 (3), Digital Signal Processing
    - ECEN 447 (4), Digital Image Processing
    - ECEN 448 (3), Real time DSP
5. Robotics/Embedded Systems
    - CSCE 420 (3), Artificial Intelligence
    - CSCE 452 (3), Robotics

- CSCE 456 (4), Real-time Computing
- ECEN 420 (3), Linear Control systems
- ECEN 422 (3), Control Engineering and Design Methodology

6. Information
   - CSCE 310 (3), Database systems
   - CSCE 436 (3), Computer Human Interaction
   - CSCE 444 (3), Structures of Interactive Info.
   - CSCE 470 (3), Information Storage & Retrieval
   - CSCE 438 (3), Distributed Objects
   - #ECEN 455 (3), Digital Communications

**Computer Engineering**
**Engineering Electives, Fall 2014-2017 catalogs (catalogs 137-140)**

The following courses have been approved for use in the Computing Engineering major as Engineering Electives:

- BIOL 113, Essentials in Biology (3). No prerequisites listed.
- MEEN 221, Statics and Particle Dynamics (3). Prerequisites: admission to upper division in an engineering major; MATH 251 or 253 or registration therein; PHYS 218.
- MEEN 222/MSEN 222, Materials Science (3). Prerequisites: CHEM 102, or 104 and 114, or CHEM 107/117; PHYS 218.
- MEEN 315, Principles of Thermodynamics (3). Prerequisites: MEEN 221; MATH 251 or 253.
- MATH 414, Fourier Series and Wavelets (3). Prerequisites: MATH 304, 311 or 325.
- MATH 442 (3), Mathematical Modeling (3). Prerequisites: MATH 304 and 308 or equivalents.
- MATH 471, Communications and Cryptography II (3). Prerequisites: MATH 470 or consent of instructor.
- PHYS 221, Optics and Thermal Physics (3). Prerequisites: PHYS 208 or 219; MATH 152 or 172; registration in MATH 221; 308.
- PHYS 222, Modern Physics for Engineers (3). Prerequisites: PHYS 208 or 219; MATH 308 or registration therein.

Prerequisites are as listed at catalog.tamu.edu.

Department of Computer Science and Engineering
Dwight Look College of Engineering
Texas A&M University

# Computer Engineering – Computer Science Track (CECN)

Catalog 140, 2017-18

## FRESHMAN YEAR

| First Semester | (Th-Pr) | Cr | Second Semester | (Th-Pr) | Cr |
|---|---|---|---|---|---|
| ENGL 104 Comp. and Rhetoric | (3-0) | 3 | CHEM 107 Gen. Chem. for Eng. Students | (3-0) | 3 |
| ENGR 111 Foundations in Engineering I | (1-3) | 2 | CHEM 117 Gen. Chem. for Eng. Stu. Lab | (0-3) | 1 |
| MATH 151 Engineering Mathematics I | (3-2) | 4 | ENGR 112 Foundations in Engineering II | (1-3) | 2 |
| PHYS 218 Mechanics | (3-3) | 4 | MATH 152 Engineering Mathematics II | (3-2) | 4 |
| University Core Curriculum elective[1] | | 3 | PHYS 208 Electricity and Optics | (3-3) | 4 |
| | | | University Core Curriculum elective[1] | | 3 |
| | | **16** | | | **17** |

## SOPHOMORE YEAR

| First Semester | | | Second Semester | | |
|---|---|---|---|---|---|
| CSCE 121 Intro. Prog. Design and Concepts | (3-2) | 4 | CSCE 221 Data Struct. and Algo. | (3-2) | 4 |
| CSCE 222 Discrete Struct. for Computing | (3-0) | 3 | ECEN 214 Electrical Circuit Theory | (3-3) | 4 |
| ECEN 248 Digital Sys. Design | (3-3) | 4 | MATH 308 Differential Equations | (3-0) | 3 |
| MATH 251 Engineering Mathematics III | (3-0) | 3 | University Core Curriculum elective[1] | (3-0) | 3 |
| Communication elective[4] | (3-0) | 3 | STAT 211 Principles of Statistics I | (3-0) | 3 |
| | | **17** | | | **17** |

## JUNIOR YEAR

| First Semester | | | Second Semester | | |
|---|---|---|---|---|---|
| CSCE 313 Intro. to Computer Systems | (3-2) | 4 | CSCE 315 Programming Studio | (2-2) | 3 |
| CSCE 350 Comp. Arch and Design | (3-3) | 4 | CSCE 462 Microcomputer Sys | (2-2) | 3 |
| CSCE 481 Seminar | (0-2) | 1 | ECEN 325 Electronics | (3-4) | 4 |
| ECEN 314 Signals and Systems | (3-0) | 3 | ECEN 454 Digital Int. Circuit Des | (2-2) | 3 |
| MATH 311 Topics in Applied Math I | (3-0) | 3 | University Core Curriculum elective[1] | (3-0) | 3 |
| | | | CSCE 399 High Impact Experience | | 0 |
| | | **15** | | | **16** |

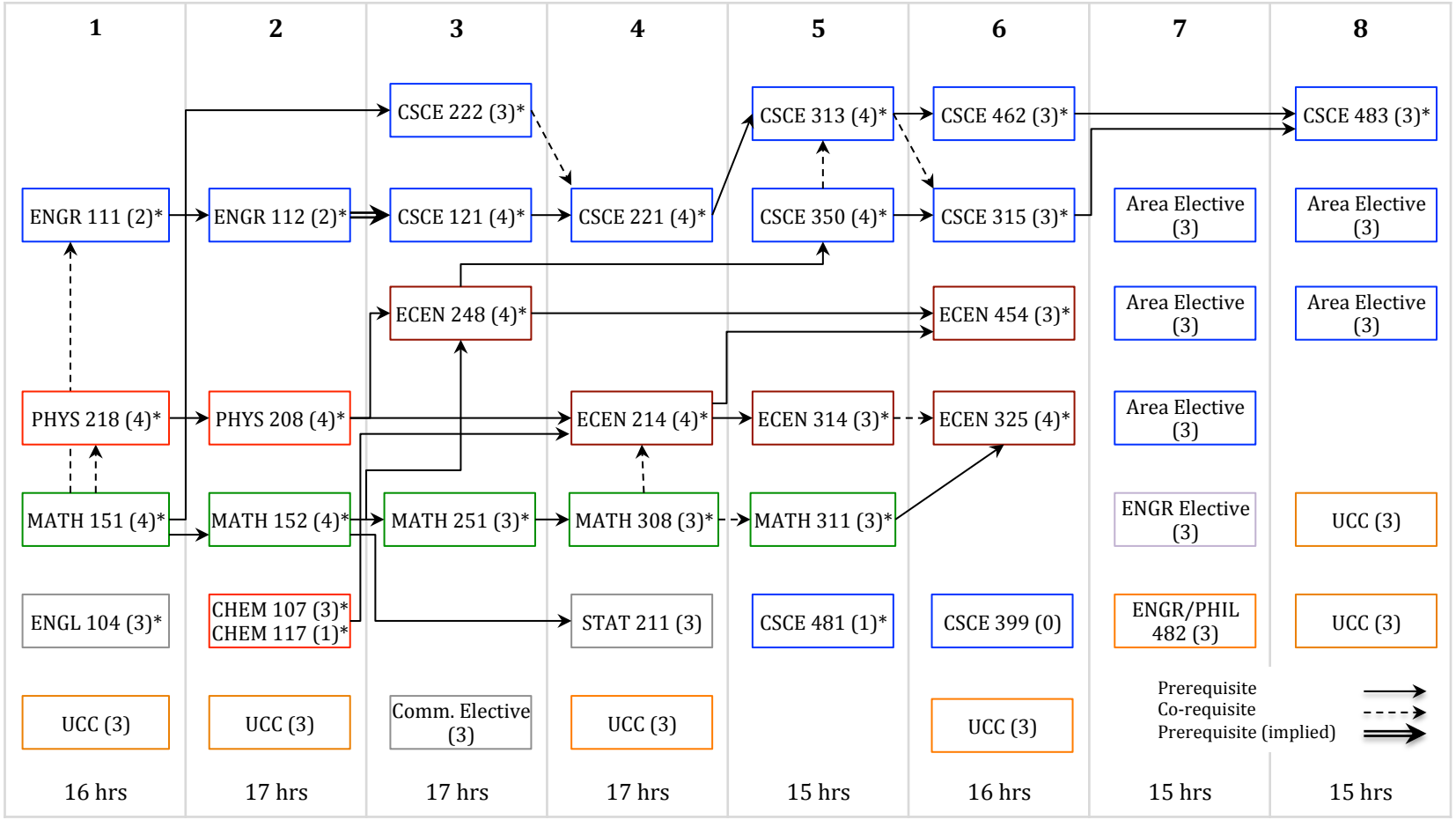
## SENIOR YEAR

| First Semester | | | Second Semester | | |
|---|---|---|---|---|---|
| ENGR 482 Ethics and Engineering | (2-2) | 3 | CSCE 483 Computer Sys. Design | (1-6) | 3 |
| ENGR Elective[3] | | 3 | Area elective[2] | | 3 |
| Area elective[2] | | 3 | Area elective[2] | | 3 |
| Area elective[2] | | 3 | University Core Curriculum elective[1] | | 3 |
| Area elective[2] | | 3 | University Core Curriculum elective[1] | | 3 |
| | | **15** | | | **15** |

**NOTES:** Grade Requirements: A grade of C or better is required for each of the following courses: CSCE 121, CSCE 221, CSCE 222, CSCE 313, CSCE 315, CSCE 350, CSCE 462, CSCE 481, CSCE 483; ENGR 111, ENGR 112; ECEN 214, ECEN 248, ECEN 314, ECEN 325, ECEN 454; MATH 151, MATH 152, MATH 251, MATH 308, MATH 311; CHEM 107/CHEM 117, PHYS 208, PHYS 218; ENGL 104.

1. To be selected from the University Core Curriculum. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from Government and Political Science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and the history requirements if they are also on the approved list of international and cultural diversity courses.
2. 15 hours of area electives chosen in consultation with academic advisor.
3. Three hours of coursework to be approved by student's advisor.
4. Select from ENGL 210 or COMM 205 or 243.

Undergraduate Degree Plan in **Computer Engineering – Computer Science Track (CECN),** Catalog 140(2017-2018)
Department of Computer Science and Engineering, College of Engineering, Texas A&M University




**NOTES**

- Courses marked with an asterisk (*) must be completed with grade of C or better.
- CSCE 481 should be taken in the student's junior year.
- Writing intensive section of ENGR 482 required; transfer courses must be approved.
- UCC: University core curriculum elective; 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from Government and Political Science.
- Comm. Elective: one of ENGL 210 or COMM 205 or COMM 243
- ENGR Elective: 3 hours of coursework to be approved by student's advisor .
- **Additional Requirements:** 6 hrs of International and Cultural Diversity courses (can be used to satisfy another requirement).

**DEGREE PLAN INSTRUCTIONS FOR**
**COMPUTER ENGINEERING MAJORS (CS TRACK)**

**2017-2018 Academic year**

The instructions contained in this packet are to be used as a guide in preparing the Departmental of Computer Science and Engineering (CSCE) Degree Plan Form for the Bachelor's Degree in Computer Engineering (CECN). A degree plan is required to be filed in Howdy by the student's third semester at the University.

Degree audits are produced by the Registrar's Office and can be viewed on-line at howdy.tamu.edu. The audit should be carefully reviewed by the student with his/her advisor, to determine the progress toward a degree.

**Total Hours Required**

The total hours on the degree plan must be at least 128. Note that the 128 hours **does not** include the two International and Cultural Diversity courses. This is because these classes can be used to satisfy both the International and Cultural Diversity requirement **and** another requirement on the degree plan—see our Web page for a list of the courses that can be used in this way. This is the **only** place where one course can be used in two places on the degree plan.

**Please note that the 128 total hours do not include a required foreign language. It is the student's responsibility to meet the University's foreign language requirement.**

**Comments and Observations**

Before visiting the Undergraduate Advisor about a degree plan, the student should make as many decisions as possible. One problem area is transfer credits. It is sometimes difficult to know which courses may be used. Efforts are made to allow 'reasonable' substitutions. A student must submit a copy of his/her transcript evaluation and a completed substitution form along with the degree plan form if credit for transferred courses is desired. To approve courses that transfer "By Title" to TAMU documentation of the courses content, such as a catalog description, will be required.

It is the **student's responsibility** to have a degree plan meet minimum requirements. Everyone involved will check, but if a graduating senior's degree plan is not acceptable (e.g., only 127 hours), the student will not graduate until the problems have been corrected.

**Required Courses**

Take all courses listed on the Degree Plan. **All courses inside the boxes must be passed with a grade of "C" or better.**

**CE Area Elective Courses**

Fifteen (15) hours of CE area electives are required (5 courses). In meeting this requirement, students are required to satisfy two depth tracks, each consisting of two courses (four courses total). The listing of depth tracks is provided separately. The remaining course can be chosen from approved CPSC, ECEN, or ENGR 385/270/470 classes:

**Computer Science and Engineering Courses (CSCE)**

Take any 300+ or 400+ courses from the Computer Science and Engineering Department

that are not included in the required courses list. Students wishing to use CSCE 485, CSCE 489, or CSCE 491 must receive approval from the undergraduate advisor (CSCE dept.).

**Electrical and Computer Engineering Courses (ECEN)**

Take ECEN 322, ECEN 326, ECEN 338, 351, 370 or any ECEN 400+ course except for those already required (e.g., ECEN 454) or equivalent to one required (e.g., ECEN 449). Students wishing to take ECEN 485 or ECEN 489 must receive approval from the CSCE dept. undergraduate advisor.

**Other Courses**

ENGR 385 (co-op) credits and EPICS (ENGR 270 and 470) credits may be used to fulfill CE area elective requirements. Excess credits above 3 cannot be used. Students are allowed to combine ENGR 385 credits with EPICS course credits; see CSCE advising for details.

**Engineering Technical Elective course**

A three (3) hour Engineering Technical Elective course is required. The list of approved courses is provided separately.

**High Impact Experience**

All students must complete a high-impact experience in order to graduate. These are often referred to in the college as ENGR[X] classes.. They will generally include classes such as independent research, study abroad, and co-op experience. The list of specific items that can satisfy this requirement as well as indication of any additional documentation required will be available from the CSCE advising office.

**University Core Curriculum courses**

Refer to core.tamu.edu for information on the core curriculum courses. The following degree-specific adjustments to the core curriculum should be noted:

**Communication:** the Communication requirement must be filled by taking two courses:

- ENGL 104
- One of the following: ENGL 210, COMM 205, COMM 243

**Mathematics:** the Mathematics requirements must be filled by the courses specified in the degree plan
**Life and Physical Sciences:** the requirement must be filled by the courses specified in the degree plan
**Language, Philosophy, and Culture:** the requirement must be filled by ENGR 482 (or PHIL 482), which is a required course. You must take a writing intensive section (a "900" section) of this course.

The University's core curriculum requirements are unchanged in the following areas: Creative Arts; American History; Government/Political Science; and Social and Behavioral Sciences. The International and Cultural Diversity requirement is unchanged from the University's requirements. Follow the University's instructions in these areas.

**Foreign Language Requirement**

Proficiency in a foreign language is required to graduate from Texas A&M University. This requirement can be met by:

- Completing two units (two full years) of high school course work in the same foreign language.
- Completing two semesters (one full year) of course work at the college level in the same foreign language, or
- Demonstrating proficiency in a foreign language by examination. See the undergraduate catalog for additional requirements under graduation requirements and Foreign Language.