Texas A&M University -- College of Engineering
Department of Computer Science & Engineering
Undergraduate Degree Plan in **Computer Science** (CPSC)
Valid for Fall 2018 Catalog

COMPUTER SCIENCE
CSCE 181 (1)
121 (4)
222 (3)
221 (4)
312 (4)
314 (3)
313 (4)
315 (3)
481 (1) [2]
482 (3)

TECH ELEC (21 HRS)
CSCE 411 (3) [3]

3 CSCE courses; one systems, software, info. tracks (see next page)
_____ (9) [3]

2 additional CSCE courses from upper level tracks
_____ (6) [3]

7th technical elective
_____ (3) [3]

EMPHASIS AREA
(non-CSCE courses)
12 hours required; requires approval of advising office; see instructions
_____ (3)
_____ (3)
_____ (3)
_____ (3)

MATH & STAT
MATH 151 (4)
152 (4)
304 (3)
MATH (3)
251 *or* 302 *or* 308

STAT 211 (3)

ENGINEERING
ENGR 102 (2)
ENGR 216 (2)

SCIENCE
PHYS 206 (3)
CHEM (4) [10]
107/117

ADDITIONAL SCIENCE
_____ (4) [11]
_____ (3) [11]

AMERICAN HISTORY
HIST ____ (3) [5, 6]
HIST ____ (3) [5, 6]

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

GENERAL ELECTIVE
_____ (1) [12]

COMMUNICATION [1]
ENGL 104 (3) [13]

_____ (3)
One of: ENGL 210, COMM 203, or COMM 205

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

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

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

INTERNATIONAL AND CULTURAL DIVERSITY
_____ (3) [4, 14]
_____ (3) [4, 14]

HIGH IMPACT EXPERIENCE
CSCE 399 (0) [9]

TOTAL HOURS 126

Superscript numbers refer to notes, which may be found on a following page

CPSC Technical Electives and Upper Level Tracks

Track 1: Algorithms and Theory

✓	CSCE 411	(prereq C or better in 221, 222)_____	Analysis of Algorithms
( )	CSCE 433	(prereq 315)_____	Formal Languages and Automata
( )	CSCE 440	(prereq 315)_____	Quantum Algorithms
( )	CSCE 442#	(prereq 221; coreq MATH 304 or 308)_____	Scientific Programming

Track 2: Systems

( )	CSCE 410***	(prereq 313, 315)_____	Operating Systems
( )	CSCE 412	(prereq C or better in 315)_____	Cloud Computing
( )	CSCE 416	(prereq 312 or 350)_____	Hardware Design Verification
( )	CSCE 456#	(prereq 313, MATH 152)_____	Real-Time Computing
( )	CSCE 461	(prereq 350 or 315)_____	Embedded Systems for Medical Applications
( )	CSCE 462	(prereq 313)_____	Microcomputer Systems
( )	CSCE 463	(prereq 313)_____	Networks & Distributed Prog.
( )	CSCE 464	(prereq 313)_____	Wireless and Mobile Systems
( )	CSCE 465	(prereq 313 and 315)_____	Computer & Network Security
( )	CSCE 469#	(prereq 350)_____	Advanced Computer Architecture

Track 3: Software

( )	CSCE 429+	(prereq 315)_____	Software Development, Globalization and Culture Abroad
( )	CSCE 430	(prereq 411)_____	Problem Solving Design
( )	CSCE 431	(prereq 315)_____	Software Engineering
( )	CSCE 434	(prereq 315)_____	Compiler Design
( )	CSCE 435	(prereq 315)_____	Parallel Computing
( )	CSCE 438	(prereq 315)_____	Distributed Objects Programming
( )	CSCE 451	(prereq 313)_____	Software Reverse Engineering

Track 4: Information and intelligent Systems

( )	CSCE 310	(prereq 221, C or better)_____	Database Systems
( )	CSCE 320	(prereq STAT 211, CSCE 222)_____	Principles of Data Science
( )	CSCE 420	(prereq 221**)_____	Artificial Intelligence
( )	CSCE 421	(prereq MATH 304, STAT 211, CSCE 221)	Machine Learning
( )	CSCE 436	(coreq 315)_____	Computer-Human Interaction
( )	CSCE 441	(prereq 221)_____	Computer Graphics
( )	CSCE 443	(prereq 441)_____	Game Development
( )	CSCE 444	(prereq 315)_____	Structures of Interactive Information
( )	CSCE 445	(prereq 221)_____	Computers and New Media
( )	CSCE 446	(prereq C or better in 221 or 441)_____	Virtual Reality
( )	CSCE 447	(prereq C or better in 221 or 441)_____	Data Visualization
( )	CSCE 452	(prereq 315)_____	Robotics and Spatial Intelligence
( )	CSCE 470	(prereq 315)_____	Information Storage and Retrieval

Untracked electives (not eligible to be counted on a track)

( )	CSCE 402	_____	Law & Policy in Cybersecurity
( )	CSCE 477	(prereq CSCE/CYBR 201)_____	Cybersecurity Risk

See notes on next page

Notes for degree plan table:

1. Courses inside box must be completed with grade of C or better
2. CSCE 481 should be taken at least three semesters before graduation
3. Technical electives require:
    a. four tracked electives (CSCE 411, a systems track elective, a software track elective, and an information track elective)
    b. three electives that are either tracked or untracked. One of these three (the seventh technical elective) can also be chosen from CSCE 491 and ENGR 385.More information about technical electives can be found on the CPSC Technical Electives and
    Upper Level Tracks course listing page.
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. All students are required to complete a high-impact experience. See CSCE advising for information
10. CHEM 119 or CHEM 101/111 can be taken instead of CHEM 107/117.
11. See instructions for details on additional science classes.
12. The general elective is any 100-499 coursework that is not otherwise excluded from the degree plan.
13. ENGL 103 (ENGL 1301) credit will be accepted in place of ENGL 104 by petition.
14. ICD classes are listed at icd.tamu.edu. Also see core.tamu.edu for the list of ICD classes that also qualify for use in a core area as well. Only ICD classes can be used to satisfy both the ICD requirement and another requirement on the major degree plan.

Notes for CPSC Technical Electives and Upper Level Tracks course listing:

- Students must take CSCE 411 and six additional courses from the list above.
- At least one course from each of the four tracks must be taken (Algorithms and Theory; Systems; Software; and Information and Intelligent Systems).
- The remaining three courses can be from any track. These can include the untracked electives.
- The seventh course also may be from outside of the track for approved options. Options for the seventh course include CSCE 491 (independent research) or co-op credits (ENGR 385). If co-op credits are used at most 3 credits are allowed. A total of 3 credits are required in any case.
- The required course CSCE 411 (Analysis of Algorithms) counts as one of the courses from the Algorithms and Theory track.
- Prerequisites will still prevail for all courses. Consult the undergraduate catalog for details.
- Approved special topics course (CSCE 489) and graduate courses may be used to fulfill these requirements; each such course will be classified with respect to the tracks; see advisor.
- +Study abroad course
- **CSCE 420's prerequisite is being changed to CSCE 411
- ***CSCE 410 taken before Spring 2009 will not fill this requirement.
- #This course is not being taught on a regular basis.

Recommended Sequence of Courses--CPSC 2018 catalog

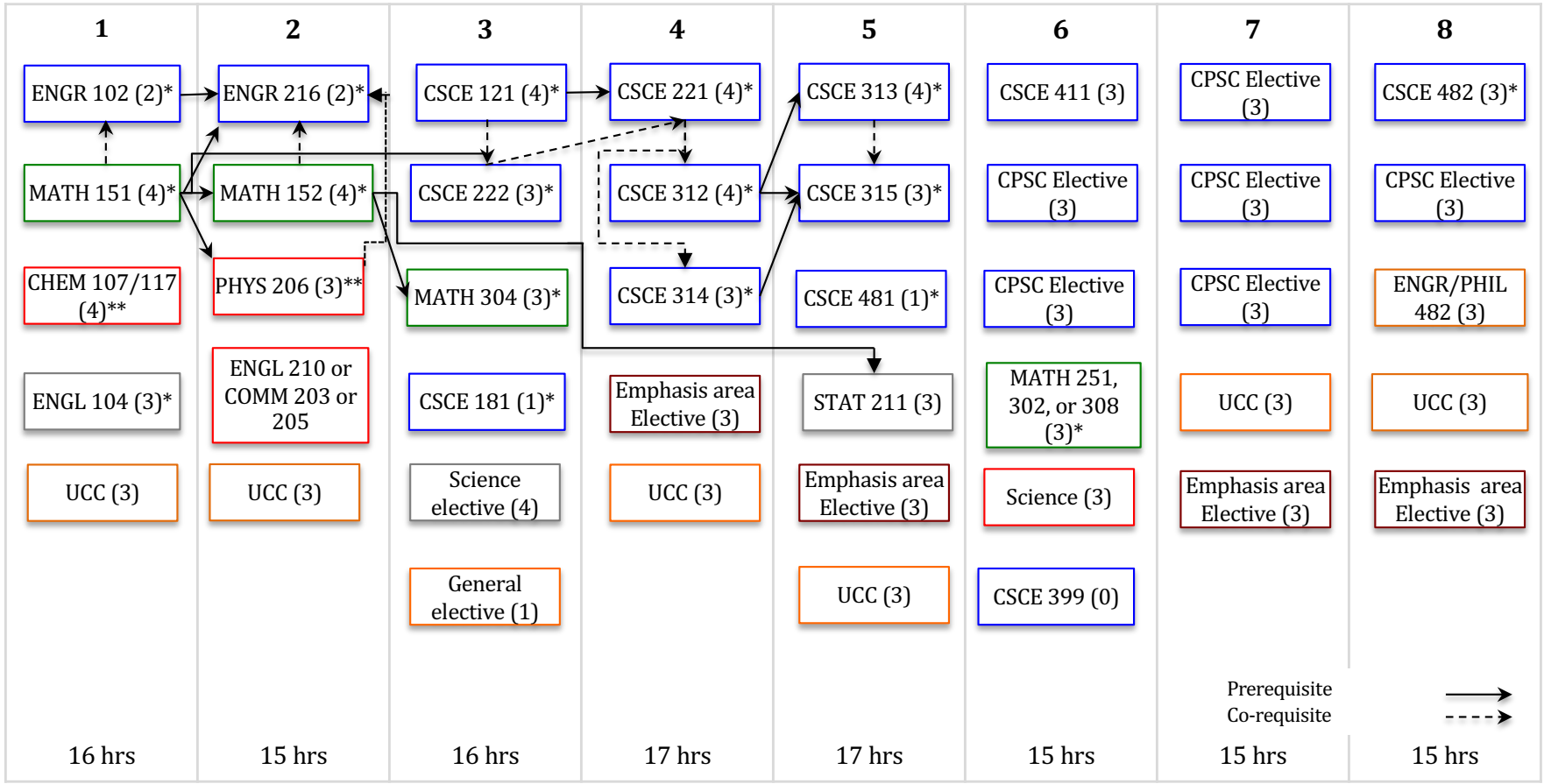
FIRST YEAR (Common Engineering First Year)				
Semester 1			**Semester 2**	
ENGR 102	2		ENGR 216	2
MATH 151	4		PHYS 206	3
CHEM 107/117	4		MATH 152	4
ENGL 104 or ENGL 103	3		ENGL 210 or COMM 203 or COMM 205	3
UCC Elective	3		UCC Elective	3
TOTAL	**16**		**TOTAL**	**15**

SECOND YEAR				
Semester 3			**Semester 4**	
CSCE 121	4		CSCE 221	4
CSCE 222	3		CSCE 312	4
CSCE 181	1		CSCE 314	3
MATH 304	3		Emphasis area elective	3
Science elective	4		UCC Elective	3
General elective	1		**TOTAL**	**17**
TOTAL	**16**			

THIRD YEAR				
Semester 5			**Semester 6**	
CSCE 313	4		CSCE 411	3
CSCE 315	3		Computer Science Elective	3
CSCE 481	1		Computer Science Elective	3
STAT 211	3		MATH 251, 302, or 308	3
Emphasis area elective	3		Science Elective	3
UCC Elective	3		CSCE 399 High Impact Experience	0
TOTAL	**17**		**TOTAL**	**15**

FOURTH YEAR				
Semester 7			**Semester 8**	
Computer Science Elective	3		CSCE 482	3
Computer Science Elective	3		Computer Science Elective	3
Computer Science Elective	3		ENGR/PHIL 482	3
UCC Elective	3		UCC Elective	3
Emphasis area elective	3		Emphasis area elective	3
TOTAL	**15**		**TOTAL**	**15**

Undergraduate Degree Plan in **Computer Science (CPSC),** Fall 2018 Catalog
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.
- See the instructions for further details on science classes.
- CSCE 481 should be taken at least three semesters before graduation.
- Writing intensive section of ENGR 482 required; transfer courses are unlikely to qualify and 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.
- ENGL 103 (ENGL 1301) will be accepted in place of ENGL 104 on petition.
- *Comm. Elective*: one of ENGL 210 or COMM 203 or COMM 205
- Prerequisites and co-requisites are only shown for selected key classes. Consult the catalog for full details. Prerequisites and co-requisites for some CSCE classes are not yet reflected in the catalog.
- *Emphasis area electives*: The emphasis area should be chosen only after consultation with a departmental advisor who will help the student arrange a program appropriate to his or her plans following graduation. Students should file a degree plan before taking these courses to ensure their use in the degree plan.
- **Additional Requirements:** 6 hours of International and Cultural Diversity courses (can be used to satisfy another requirement).

DEGREE PLAN INSTRUCTIONS FOR COMPUTER SCIENCE MAJORS

2018-2019 Academic year

The instructions contained in this packet are to be used as a guide in preparing the Department of Computer Science and Engineering (CSCE) Degree Plan Form for the Bachelor's Degree in Computer Science (CPSC). A degree plan is required to be filed and approved in Howdy before registration will be allowed for the Spring semester of the academic year following the student's entry into the University. It then must be renewed on an annual basis.

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

Hours & Technical Electives

The total hours on the degree plan must be at least **126.** Note that the 126 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 the advising office 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 126 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, in that 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 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 125 hours), the student will not graduate.

Computer Science Courses

Thirty (30) hours of CSCE classes are required **to be passed with a grade of at least "C"** as follows: **CSCE 121(4), 181(1), 221(4), 222(3), 312(4), 313(4), 314(3), 315(3), 481(1), and 482(3). CSCE 411(3)** is also required for all majors but does not require C or better. Technical electives follow a track system; see the separate description. Other non-CSCE courses in the degree plan also require grades of C or better (14 hours of Math; CHEM 107/117; PHYS 206; ENGR 102; ENGR 216; ENGL 104).

Please note that courses are **not necessarily taken in strict numerical order**. For example, CSCE 221 requires CSCE 222 as a co-requisite; CSCE 312 and 314 are generally taken together in the semester preceding CSCE 313 and 315.

Note that all courses on the CPSC degree plan must be taken for a grade. This is College of Engineering policy.

Emphasis Area

Completion of the emphasis area classes requires 12 hours in a single area **approved by a CSCE advisor** that is not otherwise used on the major's degree plan. With certain exceptions, the emphasis area classes must include 300 and 400 level classes (also called "upper level"

classes) and have generally selected from the physical sciences, engineering, mathematics, business, visualization, social sciences, or liberal arts. There must be a clear connection to computing and the classes must be selected from a *single academic area* (which, with some exceptions as described below, we generally interpret as meaning the courses come from the same department).

Here are some ***examples*** of commonly selected options. If you wish to suggest a different set of classes, see an advisor:

Math: Twelve hours beyond those used in the other parts of the CSCE degree plan are required. These 12 hours are to be selected from 400-level math electives (not including MATH 403, which cannot be used), except that at most six hours can be selected from the classes in the MATH 251, 302, 308 grouping that have not been used to fill that 3 hour degree plan requirement. CSCE 442 (when offered) can also be used here, but in this case MATH 417 cannot be used (in this case, CSCE 442 could *not* also be used as a technical elective). Note that these requirements are beyond those required by the Math minor—the Math minor does *not* provide enough credits to meet the emphasis field's requirements but the emphasis area *does* provide enough credits to also fill the Math minor's credits (assuming grades of C or better).

Business: Take classes towards the official Business minor. We do not require that this minor be completed but encourage students to do so as there are only two classes beyond those that can be used here in the degree plan to take. The following classes from the minor will be used to fill the emphasis area requirement: ACCT 209, FINC 409, MGMT 309 and MKTG 409. MGMT 209 can be used towards the degree plan's General Elective. The remaining class needed to complete the official Business minor (ISYS 209) is not used on the Computer Science degree plan.

Art: Complete the Minor in Art offered by the Department of Visualization. The minor should follow the traditional media emphasis if the student intends to apply to the Visualization department's master's program.

Foreign languages: 12 hours of foreign language classes are allowed. A special exception is made here to allow language training classes, which generally are entirely at the 100 and 200 level. This is distinct from the degree's foreign language requirement, which usually has already been met with high school classes.

Cybersecurity: Choose 12 hours from the list of non-CSCE classes approved for the Cybersecurity minor. The interdisciplinary track is most likely to provide the appropriate classes. Students may wish to declare a Cybersecurity minor as well as this will likely increase access to some of the classes. Note that the emphasis area is likely to require at least one more class than the requirements for the Cybersecurity minor.

Game: Choose 12 hours from the list of non-CSCE classes approved for the Game minor. Students may wish to declare a Game minor as access to the VIST classes is easier in this case.

Neuroscience: Choose 12 hours from the list of non-CSCE classes approved for the Neuroscience minor. Students may wish to declare a Neuroscience minor as this may ease access to some of the classes.

STEM areas: In general, a sequence of classes from a STEM department will qualify for the emphasis area. Service courses should not be used. Courses cannot "double count"—if they are being used for another degree requirement, they cannot be used for the emphasis area.

Liberal arts and social science areas: In general, the student will need to select classes carefully to be able to justify the relationship of the courses to computing. For example, in music, courses that are related to use of computers in performance or composition are easier to justify than are general performance-related classes. Similarly, in English, digital humanities or technical writing related areas are easier to justify than are literature courses. Upper level courses must be included.

Double degree, double major, post-baccalaureate degrees: We use credits from the other degree if they are available (e.g., if not needed to meet the 30 credit differential between double degree majors).

Other areas: Many other options are possible; consult with the CPSC advising office to discuss your ideas since not all classes or areas are usable. At least 12 usable credits not otherwise used on the CPSC degree plan are required for completion of the emphasis area. Please note that the requirements for minors (with the exception of the Art minor discussed above) are independent of the emphasis area requirements—as one example, the Math minor does *not* provide enough credits to meet the emphasis area requirement—additional Math classes will be required beyond the minor's requirements

(see above for details about using Math courses). Taking the first 12 credits of an official minor does not automatically satisfy the 12 hour requirement for the emphasis area.

In the case of a course that is cross-listed between CSCE and another department, we will allow use of either version of the course in a corresponding emphasis area ***if*** the course is not needed elsewhere on your degree plan to meet major requirements.

Note: The emphasis area classes will not appear on your degree plan until the advising office makes a request to have the degree plan modified. Since these requests only can use classes already on your transcript, we generally make them as you near graduation. The same holds for degree plans entered in the Degree Planner—simply note these classes in your comments with the plan and they will be taken into consideration when we review the plan.

Note: With the exception of the Art emphasis area, the emphasis area is **not** a minor. The same coursework can be used for the emphasis area and for a minor but completing one does not imply completing the other.

If you are seeking a double major or a double degree, courses from your other major are used to fill the emphasis area requirement as long as there are the needed 12 credits.

Mathematics and Statistics

Fourteen hours of Mathematics and three hours of Statistics are required. The courses listed inside the box must each be passed with a grade of at least "**C**". The elective mathematics course must be either MATH 251, 302, or 308. The choice of an emphasis area often dictates this elective. Note that we only will allow two of the following three courses to be used on your degree plan: CSCE 222, MATH 220, MATH 302.

NOTE: MATH 151 has a prerequisite of algebra, trigonometry and analytical geometry and requires a sufficient grade on the math placement exam. If MATH 150, 102, 103, or 104 are taken to meet these requirements, they may not be used for credit on the degree plan's requirement of 126 hours.

Science Courses

The CPSC degree plan requires 14 credits of science. Seven of these credits are provided by the required classes CHEM 107/117(4) [or CHEM 119(4) or CHEM 101/111(4)] and PHYS 206(3). The remaining seven credits are selected from the following classes: ATMO 201(3), ATMO 202(1), BIOL 101(4), BIOL 107(4), BIOL 111(4), BIOL 112(4), CHEM 120(4) [or CHEM102/112(4)], GEOG 203(3), GEOG 213(1), GEOL 101(3), GEOL 102(1), GEOL 106(4), PHYS 207(3)* [or PHYS 2426(4)], RENR 205(3), RENR 215(1).

*if PHYS 207(3) is taken, one credit of ENGR/PHYS 217 also will be allowed towards this requirement.

Note: Just to be explicit, you cannot have both CHEM 101/111 and CHEM 107/117 in your science classes.

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 (and other University general requirements)

Refer to core.tamu.edu for information on the core curriculum courses and icd.tamu.edu for information on ICD courses that are not in the core curriculum. 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 or ENGL 103
- One of the following: ENGL 210, COMM 203, COMM 205

Note that the communication requirement is different from the University Writing requirement (the University Writing requirement is filled from within the major-specific classes).
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 also 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 catalog for additional requirements under graduation requirements and Foreign Language.