

Field of Study Curriculum for Engineering

Engineering is a very broad field that covers many disciplines; consequently, there is significant variance in engineering curricula among our state institutions. Even within an engineering specialty like chemical or electrical engineering there are differences that reflect varied areas of focus or innovations from one institution to the next. Nevertheless, the field of study curriculum for engineering is designed to promote maximum transferability for students while still preserving appropriate curricular diversity for institutions. As indicated in the following table, some field of study courses apply to any undergraduate engineering program, while other courses apply when the engineering program at the receiving institution requires such courses.

Therefore, there are no discrete field of study courses for specific specialties of engineering (chemical, civil, electrical, mechanical, etc.) Rather, a course is considered part of the field of study curriculum for an engineering program if:

- 1) it is listed in the table as applying to "all programs;"
- or**
- 2) it is listed as applying to "only those programs requiring the course" **and** is required by the program at the receiving institution.*

If a course is not listed as a field of study course, then (as is the usual practice), a student can still transfer the course if there is a local agreement between the sending and receiving institutions.

The content areas of the field of study courses are from two areas of mathematics, two areas of science, and two areas of engineering. For a number of students, credits in some of these math and science courses would also satisfy components of the core curriculum. Note that additional matrices that follow the field of study table specify in more detail how certain configurations of coursework transfer.

Courses contained in the field of study curriculum for engineering (as defined by this document) will transfer freely among Texas public institutions of higher education. Receiving institutions may, however, require transfer students to successfully complete courses that are not part of this field of study curriculum if completion of those courses is required of all students in order to receive a baccalaureate degree in engineering. In addition, the receiving institution can specify minimum acceptable grades for courses accepted in transfer.

*For example, a student at Community College X completed a General Chemistry II (Chem II) course and wishes to transfer to a mechanical engineering program at a university. General Chemistry II is designated in the Field of Study as "only those programs requiring Chem II." Therefore, if the mechanical engineering program at University A requires Chem II, then this institution would have to accept the course in transfer. But if the mechanical engineering program at University B does not require Chem II, then this institution would not be obligated to accept the course in transfer as part of the major.

Further, if the mechanical engineering program at University A at some point eliminates the General Chemistry II requirement, then the institution must accept Chem II in transfer as part of the major only if the student completed the course when the Chem II requirement (indicated in the university's catalog for that year) was still in effect. If the mechanical engineering program at University B at some point adds General Chemistry II as a requirement, the institution must then start accepting Chem II in transfer to be applied to the major.

FIELD OF STUDY CURRICULUM FOR ENGINEERING

| Content Area | Academic Course Guide Manual (ACGM) Title | ACGM Course No. | SCH | Applicable Engineering Programs |
|---|---|--|---------------------|---|
| Calculus | Any combination of: Calculus I (3 or 4 SCH versions); Calculus II (3 or 4 SCH versions); Calculus III (3 or 4 SCH versions) that total a minimum of 8 SCH | MATH 2313 MATH 2413 MATH 2314 MATH 2414 MATH 2315 MATH 2415 | 8 – 12 ¹ | All |
| Differential Equations/ Linear Algebra | Differential Equations (3 or 4 SCH version) | MATH 2320 MATH 2420 | 3 – 8 | Only those programs requiring these course(s) – See matrix #1 |
| | Linear Algebra (3 or 4 SCH version) | MATH 2318 MATH 2418 | | |
| | Differential Equations and Linear Algebra (3 or 4 SCH version) | MATH xxxx MATH xxxx | | |
| Chemistry | General Chemistry II (lecture & lab) OR General Chemistry II (lecture) AND General Chemistry Laboratory II | CHEM 1412 CHEM 1312 CHEM 1112 | 4 | Only those programs requiring CHEM II |
| Physics (Calculus-based) | University Physics I (lecture) OR University Physics I (lecture and lab) AND University Physics II (lecture) OR University Physics II (lecture and lab) | PHYS 2325 PHYS 2425 PHYS 2326 PHYS 2426 | 6 – 8 ¹ | Lecture component required by all – See matrix # 2 |
| | University Physics Laboratory I AND University Physics Laboratory II | PHYS 2125 PHYS 2126 | | |
| Circuits | Circuits I for majors OR Circuits I for majors with Lab | ENGR xxxx ENGR xxxx | 3 | Only those programs requiring Circ I (major and non majors) |
| Engineering Mechanics | Engineering Mechanics I – Statics (3 or 4 SCH version) | ENGR 2301 ENGR 2401 | 3 - 8 | Only those programs requiring these course(s) – See matrix #3 |
| | Engineering Mechanics II – Dynamics (3 or 4 SCH version) | ENGR 2302 ENGR 2402 | | |
| | Statics and Dynamics (3 or 4 SCH version) | ENGR 2303 ENGR 2403 | | |

TOTAL SCH 27 - 43

¹ A student completing coursework totaling less than the minimum SCH requirements for calculus and physics lecture will obtain transfer credit at the receiving institution for each course successfully completed at the sending institution.

The following three matrices show how specified courses and combination of these courses would transfer from the sending to the receiving institution for field of study engineering courses.

✓ = transfers; x = does not transfer; other is explained by text.

Matrix 1. Differential Equations and Linear Algebra

Receiving Institution

| | | Receiving Institution | | | |
|---------------------|--------------------------------------|-----------------------|----------------------------------|----------------------------------|---|
| Sending Institution | | Course | Differential Equations | Linear Algebra | Differential Equations and Linear Algebra (combined) |
| Sending Institution | Differential Equations | | ✓ | x | The Differential Equations course and the Linear Algebra course <u>together</u> transfer as the combined course |
| | Linear Algebra | | x | ✓ | |
| | Diff. Eq. and Linear Alg. (combined) | | Decided by receiving institution | Decided by receiving institution | ✓ |

Note: The transferable courses in this table are considered part of the field of study curriculum if the program of the receiving institution requires them.

The interpretation of this matrix is as follows:

- A student who has taken only Differential Equations (DE) would receive credit for DE (if it was required by the receiving institution) but would not receive credit for Linear Algebra (LA) or the combined DE/LA course.
- Similarly, a student who has taken only LA would receive credit for LA (if it was required by the receiving institution) but would not receive credit for DE or the combined DE/LA course.
- A student who has taken both DE and LA would get credit for both DE and LA (if both courses were required by the receiving institution) or the student would receive credit for the combined DE/LA course (if it was required). In the latter case, a student would receive the number of credits in the combined course. For example, if a student has taken a 3 SCH DE course and a 3 SCH LA course and transfers to a university that offers and requires only a 3 SCH DE/LA course, then that student would receive transfer credit of 3 SCH for the combined DE/LA course.
- A student who has taken the combined DE/LA course would get credit for the combined course (if it were required by the receiving institution). However, if the receiving institution required either the separate DE course or the LA course or both, then the receiving institution could decide whether to award any credit for the student's combined DE/LA course.

Matrix 2. University Physics

Receiving Institution

| Course | Physics – lecture only (3 SCH) | Physics – lab only (1 SCH) | Physics – lecture and lab combined (4 SCH) |
|--|--|----------------------------------|--|
| Physics lecture | ✓ | x | The lecture course and the lab course <u>together</u> transfer as the combined lecture and lab course |
| Physics lab | x | ✓ | |
| Physics lect. and lab (combined) | Transfers as the lecture only or as both the lecture course and the lab course | | ✓ |

Note: The lecture component is a required field of study course. The lab component is a field of study course if the program of the receiving institution requires it.

Matrix 3. Engineering Mechanics—Statics and Dynamics

Receiving Institution

| Course | Statics | Dynamics | Statics and Dynamics (combined) |
|---------------------------------------|--|--|---|
| Statics | ✓ | x | The Statics course and the Dynamics course <u>together</u> transfer as the combined course |
| Dynamics | x | ✓ | |
| Statics and Dynamics (combined) | Decided by receiving institution | Decided by receiving institution | ✓ |

Note: The transferable courses in this table are considered part of the field of study curriculum if the program of the receiving institution requires them.