

Executive Summary

The following packet assembled by the Engineering and Physics Department proposes the modification of the Bachelor of Science in Engineering (BSE) degree plan to include 5 concentrations which will allow each student to gain depth in one of the following areas:

1. Civil Engineering (CE)
2. Electrical Engineering (EE)
3. Industrial Engineering (IE)
4. Mechanical Engineering (ME)
5. General Engineering (GE)

Currently, the BSE degree plan requires students to take a total of 55 ENGR courses, 41 hours of which make up the ENGR core with the remaining 14 hours designated as ENGR electives (chosen with their advisor in areas of General, Electrical, or Mechanical Engineering). The proposed modifications reduce the existing ENGR core to 33 hours, allowing for 22 hours of depth electives in one of the concentrations (to be outlined in the catalog as Engineering Concentrations) listed above.

The packet contains the paperwork necessary to achieve these modifications including:

- 21 new courses packets
- 6 existing course modifications
- 2 cross listings for approval
- BSE major catalog modification
- New concentration application

It is our hope that these modifications to the BSE degree will provide students with the opportunity to gain deeper knowledge in a specific engineering concentration which will position them more favorably as they enter the engineering industry. Additionally, it is our belief that these modifications will make the ACU Engineering program more competitive and attractive to potential students, thus resulting in an increase in the number of majors.

We are hopeful that the information provided is clear, and we are happy to answer any questions you may have.

Thank you in advance for your time and efforts,

ACU Engineering and Physics faculty

Approval Chart for Curriculum Changes

A = Approve I= Information Item¹ R= Advise & Respond²

Course Number _____ or Degree Plan(s) Engineering

State the requested change and reason. A memo may be attached if more space is necessary.

See Attached concentration proposal

Circle the number that corresponds to the requested change. Degree plan changes are on the second page.

		Dept./School	College Academic	Deans	COUNCIL ³				Provost	President
					TEC	UGEC	UUAC	GRAD		
1.	Title (description unchanged)	A	A	A		I			I	I
2.	Description (not affecting content)	A	A	A		I			I	I
3.	Course term(s)	A	I	A		I			I	I
4.	Content (substantive change)	A	A	A		I			A	A
5.	Number of hours (lecture, lab, contact)	A	A	A		A			A	A
6.	Course number within the hundred	A	A	I		I			I	I
7.	Course number beyond the hundred	A	A	A		A			A	A
8.	Prerequisites	A	A	A		I			I	I
9.	Course fee(s)	A	--	A		--			A	I
10.	From U to G or G to U	A	A	A		A			A	A
11.	Cross list with another department: U or G level	A	A	A		A			A	A
12.	Department of record	A	A	A		A			A	A
13.	Open or close a course	A	A	A		A			A	A
14.	New course — See website for application and process. This change includes combining or splitting a course(s).	A	A	A		A			A	A

Note: When an academic unit does not have a council, the UGEC and/or UUAC will serve as its academic council, depending on the nature of the issue.

Approval Chart for Curriculum Changes

A = Approve I= Information Item¹ R= Advise & Respond²

		COUNCIL ³							Board of Trustees
Change to a Degree Plan		Dept./School	College Academic	Deans	TEC	UGEC	UUAC	GRAD	
1.	University Requirements — Change in approved course content ⁶	A	A	A		A		A	--
2.	University Requirements — Add or drop a required course from the University Requirements chart ⁶	A	A	A		A		A	A
3.	University Requirements — Add or drop a course from a menu within the University Requirements ⁶	A	--	--		A		A	--
4.	University Requirements — Change hours within a menu on the University Requirements chart ⁶	A	A	A		A		A	A
5.	Major — Revision of major ^{4,5}	A	A	A		A		A	--
6.	Major — Adopt or change admission requirements	A	A	A		A		A	--
7.	Major — Add ^{4,5}	A	A	A		A		A	A
8.	Major — Discontinue (proposed by the department or college)	A	A	A		A		A	A
9.	Major — Discontinue (proposed by the Provost)	See below.							
10.	GPA — Revise major or cumulative requirement	A	A	A		A		A	A
11.	Minor — Revise course selection	A	A	A		I		I	--
12.	Minor — Add	A	A	A		A		A	--
13.	Minor — Discontinue (proposed by the department or college)	A	A	A		A		A	--
14.	Minor — Discontinue (proposed by the Provost)	See below.							
15.	Degree — Add	A	A	A		A		A	A
16.	Degree — Discontinue (proposed by the department or college)	A	A	A		A		A	A
17.	Degree — Discontinue (proposed by the Provost)	See below.							
18.	Any change to a graduate degree program	A	A	A		A		A	--

		COUNCIL ³							Board of Trustees
Provost-Proposed Change		Provost	Department	Dean	TEC	UUAC	Graduate	Faculty	
1.	Major/Graduate Program — Discontinue (proposed by the Provost)	A	R	R		A		A	A
2.	Minor — Discontinue (proposed by the Provost)	A	R	R		A		--	A
3.	Degree — Discontinue (proposed by the Provost)	A	R	R		A		A	A

Approval Chart for Curriculum Changes

A = Approve I= Information Item¹ R= Advise & Respond²

COUNCIL ³										
	Change to the Catalog Information	Dept./School	College Academic	Deans	UGEC	UUAC	GRAD	Provost	Faculty	President
1.	General requirements for graduation including course requirements that are common to all majors for all degrees ⁷	--	--	--	A			A	A	A
2.	Admission requirements	--	--	--	A			A	A	A
3.	Policies governing academic probation and suspension	--	--	--	A			A	A	A
4.	Requirements for graduating with honors	--	--	--	A			A	A	A
5.	Other academic policy changes	--	--	--	A			A	--	A

¹ Councils may request additional information about "Information" items. These items are approved as "Consent Agenda."

² The Dean and Department should respond to the Provost's recommendation to close a program in writing. Advise & Respond (R) requires that the voting body should receive the written responses at least one week prior to the vote.

³ All courses that meet University Requirements for general education must go through UGEC. Courses or degrees offered only to students seeking teacher certification must go through the Teacher Education Council. All undergraduate changes must go before the UUAC. All graduate degree plan changes must go through the Graduate Council.

⁴ A minimum of 30 hours is required for a major. A maximum is specified for each degree (e.g., BA, BS). The university minimum for elective hours is 6, unless the requirements of external accrediting bodies make it impossible.

⁵ Program or course changes that apply to any major that includes Teacher Certification will be reviewed by the college, the Teacher Education Council (TEC), and then the UUAC.

⁶ Courses that satisfy ACU's University Requirements (General Education) will normally have lower-level numbering, be free of prerequisites and co-requisites, appeal to more than one or two majors, and "not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession" (SACS 2.7.3). Departments may request exceptions to the first three criteria.

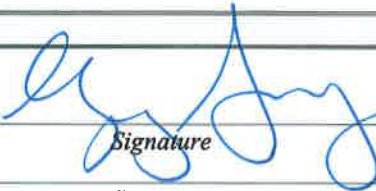
⁷ The UUAC approved the clarification that "general requirements for graduation" means the enumerated items in the "General Requirements for Bachelor's Degrees" section of the catalog.

Revised 3-8-17

Curriculum/Catalog Changes Signature Page

Department/School Chair(s)	
 Signature	10/30/18 Approval date
_____ Signature	_____ Approval date

College Academic Council(s)	
 Signature	12-7-2018 Approval date
_____ Signature	_____ Approval date

Dean(s)	
 Signature	12/28/18 Approval date
_____ Signature	_____ Approval date

Teacher Education Council	
_____ Chair's signature	_____ Approval date

General Education Council	
_____ Chair's signature	_____ Approval date

Undergraduate Academic Council	
_____ Chair's signature	_____ Approval date

Graduate Council	
_____ Chair's signature	_____ Approval date

Provost	
_____ Signature	_____ Approval date

Faculty	
_____ Chair of faculty senate	_____ Approval date

President	
_____ Signature	_____ Approval date



Engineering Concentrations Application

Department of Engineering and Physics Faculty
10/31/2018

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Application for New ENGR Concentrations

Concentration Titles: civil engineering (CE), electrical engineering (EE), general engineering (GE), industrial engineering (IE), and mechanical engineering (ME)

Type of Degree: B.S.E.

Home Department: Engineering and Physics

Program Developers: All ENGR faculty (Brown, Hewitt, Houghtalen, Jinkerson, Kennedy, Marshall, and Smith)

Input and Support: All PHYS faculty.

I. Overview

A. Mission of the program

The mission of the Abilene Christian University Department of Engineering and Physics, engineering program is to prepare engineering professionals for Christian service and leadership throughout the world.

B. Goal

The Program Educational Objectives (PEOs) are that within a few years of graduation:

1. Alumni are succeeding in engineering practice or other diverse fields that value analytical, problem solving, and professional practice skills.
2. Alumni are engaging in life-long learning that builds upon foundational knowledge acquired in their undergraduate education through graduate study, career-specific training, or other professional training.
3. Alumni are glorifying God through thoughtful integration of work and life, facilitating service to others through their profession.

C. Outcomes

The following student outcomes will prepare ACU engineering students to attain the program educational objectives:

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7. An ability to function effectively on teams that establish goals, plan tasks,

meet deadlines, and analyze risk and uncertainty.

D. Target audience

Prospective students that possess an interest in developing math and science skills with a focus on application. The audience understand and sees how their skills align in civil, electrical, industrial or mechanical engineering. Additionally, parents and family members of students in recruiting. If they are unsure, the general engineering track allows them to investigate and receive a broad engineering education that will prepare them for the Fundamentals of Engineering Exam.

E. Admission requirements

Engineering majors must develop mathematical skills as well as design, experimental, and computational abilities. If the student does not qualify to take Calculus 1 (MATH 185) when the student enters ACU, his or her graduation may be delayed.

II. Feasibility Study and Documentation

A. Relation to ACU mission and key emphases

This track aligns with the engineering program mission. Until this point ACU engineers received a BSE with a non-official emphasis in electrical or mechanical engineering (based on electives chosen in consultation with their advisor). Consistently, we have received feedback from industry representatives that advise the program, former students, and admissions that our students need more specificity in a specific engineering concentration.

The purpose of adding these concentrations is to benefit our program by benefiting students. Concentrations will allow students to be more competitive in the job market. Currently, graduates are succeeding, but do not have the depth desired by those hiring engineers for certain jobs. Adding concentrations will raise the visibility of our program to allow it to be recognizable and comparable to other schools we compete with. Currently our program competes with discipline specific degrees in the areas proposed at both our faith based competitors, as well as state schools. By still having a BSE, the concentrations helps maintain our department vision and mission of providing a well-rounded engineering education while also giving them expertise in their concentration.

B. Employment demand for graduates from the program

E&P gained insight into the needs of the engineering marketplace by examining employment projection data from the Bureau of Labor and statistics for both the US (for 2016-2026) and Texas (for 2014-2024). Data indicates (see Table 1) that the top needs (by number of average annual openings) are Civil (CE), Mechanical (ME), Industrial (IE), and Electrical (EE), in that order for both the US and Texas.

Table 1: Engineering Job Growth in Proposed Concentrations at State and National Level.

Occupation	US Data (2016-2026)					Texas Data (2014-2024)				
	Annual Average Employment		Employment Change, 2016-26 (1000s)		Annual Average Openings (1000s)	Annual Average Employment		Employment Change, 2014-24 (1000s)		Annual Average Openings (actual)
	2016	2026	#	%		2014	2024	#	%	
Civil engineers	303.5	335.7	32.2	10.6	25.9	25.29	31.34	6.05	24%	1350
Electrical engineers	188.3	204.5	16.2	8.6	13.9	13.77	16.16	2.39	17%	545
Industrial engineers	257.9	283.0	25.1	9.7	19.7	14.3	16.18	1.88	13%	605
Mechanical engineers	288.8	314.1	25.3	8.8	21.2	19.32	22.65	3.33	17%	945

In addition to seeking national job demand data, E&P sought external reports from credible sources including those from the American Society of Engineering Educators (ASEE), who recently released a National Science Foundation (NSF) report titled, “Transforming Undergraduate Engineering Education.” The report states that both students and industry professionals in engineering desire “a T-shaped professional — one who possesses deep expertise within a single domain, broad knowledge across domains, and the ability to collaborate with others in a diverse working environment.” (ASEE, 2017).

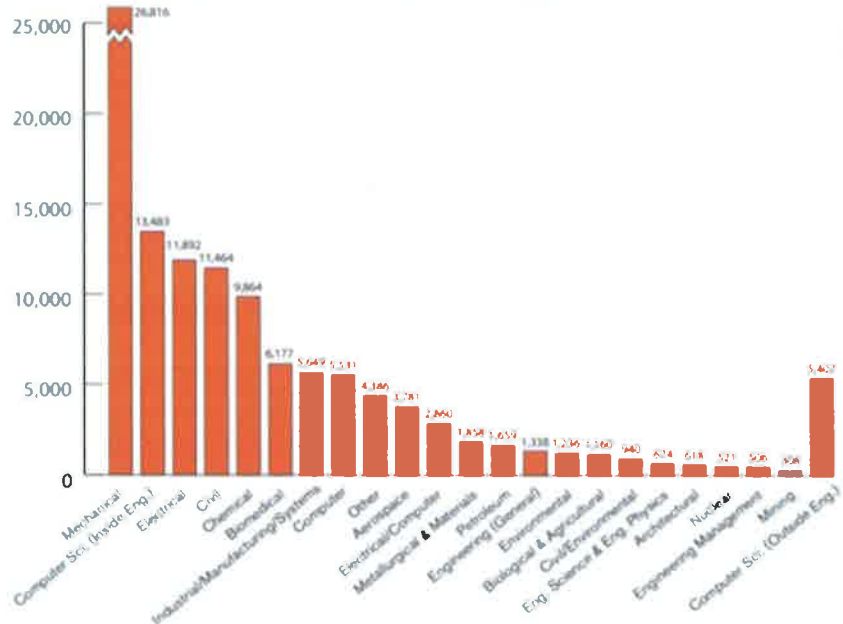
After examining the data and reading several reports, E&P then presented the data to the ACU Engineering Industrial Advisory Board (IAB) along with data about ACU student interest (presented in the Students section). The IAB consists of senior level engineers, engineering company owners, and hiring managers from a variety of engineering disciplines. The board meets twice a year to analyze the progress of their recommendations and the state of the engineering program. At the conclusion of the spring 2017 meeting, which included a discussion of the curriculum, the board produced a report that documented the meeting. In the report they stated, “the board also noted the weaknesses of this core if a student knows for sure they want to pursue a focused sub-discipline, such as Mechanical, Electrical, or Civil Engineering, which have well-known undergraduate course requirements. The board recommends, if possible, that the

department offer core track flexibility for both options—a general track for FE exam prep for general B.S.E. majors, and discipline specific tracks with increased electives for students sure of which concentration they wish to pursue.” In subsequent meetings the board has worked with faculty to develop the proposed concentrations that meet the needs of their specific industry while also fitting within the ACU curriculum.

C. Prospective student interest, student pool

E&P also investigated the current graduation rates by discipline to aid in narrowing which disciplines students prefer. Further, the data (Yoder, “Engineering by the Numbers”, ASEE, 2016) indicated that students interest (based upon number of graduates) was similar to job openings with ME being largest followed by EE, CE, Chemical Engineering, Biomedical Engineering, and IE (Figure 1). Additionally, the Introduction to Engineering and Physics course at ACU was polled for their discipline interest from the years 2014-2016 and aligned with the national data. Finally, senior exit surveys and interviews with the Executive Director of Engineering indicate graduating students desire more depth in specific disciplines.

BACHELOR’S DEGREES AWARDED BY ENGINEERING DISCIPLINE: 112,721*



*Total does not include computer science (outside engineering)

Figure 1: Bachelor's Degrees Awarded by Major

III. Curriculum Outline

A. Existing courses, rotation and frequency

Below (Table 2) are the proposed modifications to the current ENGR core (that being ENGR courses required by all ENGR majors for the Bachelor of Science in Engineering degree), a total of 33 hours. Additionally, each concentration has a pool of hours that they should choose 22 hours from to bring the ENGR total to 55 hours (this is the same total number of ENGR hours currently required). The reason for the 3 hour ENGR 300-498 possibility is to allow for some flexibility in the degree plan.

Table 2: Proposed BSE Curriculum with Concentration Electives

Engineering Core, required for all BSE majors	Credit Hours	Offerings
ENGR 115: Introduction to Engineering and Physics	2	Fall
ENGR 116: Introduction to Engineering and Physics Lab	1	Fall
ENGR 131: Computer Based Design	1	Each Semester
ENGR 135: Introduction to Electric Circuits	3	Spring
ENGR 136: Introduction to Electric Circuits Lab	1	Spring
ENGR 221: Statics + Dynamics	4	Each Semester
ENGR 281: Thermodynamics	3	Spring
ENGR 306: Engineering Ethics	1	Fall
ENGR 333: Fluid Mechanics	3	Fall
ENGR 350: Engineering Economics	3	Fall
ENGR 390: Jr. Clinic	3	Spring
ENGR 430: Sr. Clinic I	3	Fall
ENGR 432: Sr. Clinic II	3	Spring
ENGR Electives	2	Varies
Engineering Core Total	33	

Engineering, Civil Concentration, BSE (CE) (Choose 19 hours from the following list)	Credit Hours	Offerings
ENGR 272: Surveying and Geomatics	3	Fall (Odd)
ENGR 332: Mechanics of Materials	3	Spring
ENGR 370: Structural Analysis	3	Fall
ENGR 372: Soil Mechanics	3	Spring (Even)
ENGR 373: Engineering Field Methods Lab	1	Spring
ENGR 376: Water Resources Engineering	3	Spring
ENGR 378: Introduction to Environmental Engineering	3	Fall (Even)
ENGR 470: Design of Structures	3	Spring (Odd)
CE Total Options	22	
Engineering, Electrical Concentration, BSE (EE) (Choose 19 hours from the following list)	Credit Hours	Offerings
ENGR 210: Digital Logic	3	Spring
ENGR 355: Electronic Devices	3	Fall (Odd)
ENGR 356: Electronic Devices Lab	1	Fall (Odd)
ENGR 360: Electricity and Magnetism	3	Spring (Even)
ENGR 387: Power Electronics and Electromechanics	3	Fall (Even)
ENGR 388: Network Analysis	3	Spring
ENGR 410: Signal Processing	3	Spring (Odd)
ENGR 422: Embedded Systems	3	Fall
ENGR 423: Embedded Systems Lab	1	Fall
EE Total Options	24	
Engineering, Industrial Concentration, BSE (IE) (Choose 19 hours from the following list)	Credit Hours	Offerings
ENGR 251: Management Engineering	3	Spring
ENGR 320: Materials Science	3	Fall
ENGR 321: Manufacturing Processes Lab	1	Fall
ENGR 332: Mechanics of Materials	3	Spring
ENGR 351: Statistical Quality Control	3	Fall (Odd)
ENGR 352: Engineering Optimization	3	Spring (Even)
ENGR 353: Management Systems and Production Planning	3	Fall (Even)
ENGR 450: Simulation	3	Spring (Odd)
IE Total Options	22	

Engineering, Mechanical Concentration, BSE, (ME) (Choose 19 hours from the following list)	Credit Hours	Offerings
ENGR 320: Materials Science	3	Fall
ENGR 322: Advanced Dynamics and Vibrations	3	Fall (Odd)
ENGR 331: Fluid Mechanics Lab	1	Fall
ENGR 332: Mechanics of Materials	3	Spring
ENGR 334: Heat and Mass Transfer	3	Spring
ENGR 338: Design of Machine Elements	3	Spring (Even)
ENGR 435: Finite Element Analysis	3	Fall (Even)
ENGR 436: Systems and Controls	3	Spring (Odd)
ME Total Options	22	
Engineering, General Concentration, BSE (GE)	Credit Hours	Offerings
ENGR 320: Materials Science	3	Fall
ENGR 332: Mechanics of Materials	3	Spring
ENGR Total Options	6	

ENGR Electives	Credit Hours	Offerings
CE, EE, IE, ME Concentrations		
ENGR Elective (300-498)	3	Varies
GE Concentrations		
ENGR Elective (200-498)	6	Varies
ENGR Elective (300-498)	10	Varies

For additional reference below (Table 3) is a summary of offerings by semester.

Table 3: ENGR Offerings by Semester

Fall & Spring ENGR Offerings		
ENGR 131: Computer Based Design	1	ENGR Core
ENGR 221: Statics + Dynamics	4	ENGR Core

Fall ENGR Offerings			Fall (Even) ENGR Offerings		
ENGR 115: Introduction to Engineering and Physics	2	ENGR Core	ENGR 378: Introduction to Environmental Engineering	3	CE
ENGR 116: Introduction to Engineering and Physics Lab	1	ENGR Core	ENGR 387: Power Electronics and Electromechanics	3	EE
ENGR 350: Engineering Economics	3	ENGR Core	ENGR 353: Management Systems and Production Planning	3	IE
ENGR 333: Fluid Mechanics	3	ENGR Core	ENGR 435: Finite Element Analysis	3	ME
ENGR 430: Sr. Clinic I	3	ENGR Core	ENGR 306: Engineering Ethics	1	ENGR Core
ENGR 370: Structural Analysis	3	CE	Fall (Odd) ENGR Offerings		
ENGR 422: Embedded Systems	3	EE	ENGR 272: Surveying and Geomatics	3	CE
ENGR 423: Embedded Systems Lab	1	EE	ENGR 355: Electronic Devices	3	EE
ENGR 320: Materials Science	3	IE&ME	ENGR 356: Electronic Devices Lab	1	EE
ENGR 321: Manufacturing Processes Lab	1	IE&ME	ENGR 351: Statistical Quality Control	3	IE
ENGR 331: Fluid Mechanics Lab	1	ME	ENGR 322: Advanced Dynamics and Vibrations	3	ME
Spring ENGR Offerings			Spring (Even) ENGR Offerings		
ENGR 135: Introduction to Electric Circuits	3	ENGR Core	ENGR 372: Soil Mechanics	3	Spring (Even)
ENGR 136: Introduction to Electric Circuits Lab	1	ENGR Core	ENGR 360: Electricity and Magnetism	3	Spring (Even)
ENGR 281: Thermodynamics	3	ENGR Core	ENGR 352: Engineering Optimization	3	Spring (Even)
ENGR 390: Jr. Clinic	3	ENGR Core	ENGR 338: Design of Machine Elements	3	Spring (Even)
ENGR 432: Sr. Clinic II	3	ENGR Core	Spring (Odd) ENGR Offerings		
ENGR 332: Mechanics of Materials	3	CE,IE,ME	ENGR 373: Engineering Field Methods Lab	1	CE
ENGR 376: Water Resources Engineering	3	CE,IE,ME	ENGR 470: Design of Structures	3	CE
ENGR 210: Digital Logic	3	EE	ENGR 410: Signal Processing	3	EE
ENGR 388: Network Analysis	3	EE	ENGR 450: Simulation	3	IE
ENGR 251: Management Engineering	3	IE	ENGR 436: Systems and Controls	3	ME
ENGR 334: Heat and Mass Transfer	3	ME			

B. New courses and correlation to program outcomes; title, description, competencies, developer, and teacher for each

New course packets are provided for each new course. In summary, 21 courses are being proposed. Of these 21, 3 are 1 credit hour lab courses. To make room for these courses, E&P determined that dropping several existing courses and modifying others was needed based on industry input and curriculum analysis. Measurement Techniques and its lab (ENGR 342/343), Digital Logic Lab (ENGR 211) and Environmental Health and Safety (ENGR 305) are being removed from the curriculum. We determined in consultation with out IAB that the said courses are less useful for our graduating students than providing depth in a given field. The following courses are being modified:

- Statics and Dynamics, which is being combined into a single course, dropping from six hours to four, which is common at several institutions, thus eliminating (ENGR 220 and ENGR 222). A new course packet for the course is attached.
- Computer Aided Design, which is dropping from three hours to one hour and becoming a lab.

C. Degree plan and proposed 4-year student schedule or grad student schedule

See attached catalog revision and 4 year degree plans for each of the 5 tracks at the end of this proposal.

IV. Institutional Supports Required from ACU

A. Faculty requirements and availability; impact on current loads

At this time the E&P department does not expect any faculty member to need to teach outside their areas of expertise or additional hours beyond what they are currently teaching *provided current enrollment numbers. Should the enrollment increase, this plan is not feasible.* The development of a significant number of new courses will impact the workload of all faculty members in engineering; Faculty has and expects to continue to receive support from our department chair and colleagues who recognize that curriculum development contributes to fulfillment of both the scholarship and service expectations of our department. The E&P department expects the university to provide support in the summer in the form of internal grants to develop the new classes to facilitate these changes.

Adjunct faculty will be utilized to teach a few courses each year in the Civil Engineering track. This need arises as currently there is only one civil engineer on faculty (Tim Kennedy), and he alone cannot cover all of the teaching needs in that track. However, the E&P department is well positioned to hire adjunct faculty in this

area, given the engineering landscape in Abilene. In fact, there have already been several qualified individuals (i.e. working as civil engineers, holding a master's degree in civil engineering) who live and work in Abilene express interest in joining our faculty in this capacity.

B. Staff requirements and impact on current loads

Current staff will not need to be added as the current staff: Bennett Lab Manager, Administrative Assistant, and Student Success Manager are what are currently required and what will be required for the new concentrations. There are more labs being added, but with the removal of others there is a no real net gain, though should enrollment increase, a part-time ENGR lab coordinator will be needed. Should there be more than 20 student in a single concentration cohort (CE, EE, IE, ME) or an overall increase of 30 students (all BSE majors) a new engineering faculty hire will be needed in that specific discipline.

C. Impact on existing programs in home department and other departments.

The department voted overwhelmingly in favor of the proposal for concentrations to be added to the BSE. There will be impact on the department as adding new courses requires support from the entire department. The PHYS faculty will provide support in the form of teaching of some courses in the EE concentration, but will no longer teach BSE students in PHYS 330/331. Additionally, the need for new equipment and not having as many faculty that can teach both ENGR and PHYS courses will be a stretch to department faculty due to already intense research agendas and teaching loads. If the number of students in the entire cohort (All BSE majors) exceeds the current number of students (currently approximately 50 per year) by 25 students a new section of Engineering Physics 1 and 2 and their respective labs will need to be added each semester.

Additionally, as more students matriculate into the BSE program, other departments will be affected including Math and Chemistry, specifically in MATH 185, 186, 286, and 361 and CHEM 131/133. Again, should the current number in an overall BSE cohort increase by 25 a new section of these courses and their respective labs would need to be added.

D. Administration and leadership for the program

The department is well suited with the department chair, Jess Dowdy and the Executive Director of Engineering, Tim Kennedy. Dr. Dowdy oversees budget, staffing, visiting committee, departmental assessment, scheduling, recruiting, and many other needs pertinent to the entire department. Dr. Kennedy oversees the Engineering accreditation, Industrial Advisory board, corporate relations, recruiting, Senior Capstone Project sales, and many other needs pertinent to the ENGR program.

The leadership works well together and is striving toward the goals for the department. As enrollment increases it is common in other engineering programs to hire a capstone (clinic director) as a professor of practice or other to handle the extensive load required of this industry involved course. ACU will need to consider this as well.

E. Library requirements

All new courses have been reviewed by the library and can be supported.

F. Equipment, classroom/lab space, office space requirements

Renovations of Onstead Science Center and Bennett Gymnasium provide the space needed for labs and classrooms for the proposed changes. Additionally, office space is adequate for the faculty and staff.

Additional equipment, software, and standards are needed, such as a materials testing machine, surveying equipment, finite element analysis software, simulation software, ASME standards, etc. Thankfully, many of these items are listed in the current comprehensive equipment list that E&P will spend as a part of the funds raised for equipment in the new Bennett Gym and Onstead Science Center. As long as funds can be raised as expected for the new building equipment should be able to be purchased.

G. Recruiting and scholarships

This will raise the level of recruiting by allowing students and parents to better relate to the other universities we compete with for students. The approach provides a larger pool of students for recruitment and meets the desires E&P hears from those in admissions.

H. Impact on revenue of the university

The E&P department anticipates that for the university bottom line, long-term gains from increased student enrollment in engineering will more than offset the expense required to staff one/two courses per year with adjunct faculty.

V. Assessment Plans

The Engineering program currently has an assessment plan that is informed by the accrediting body, ABET. The assessment plan had been in place since 2016. As the core has changed in the proposal, the Engineering faculty modified the assessment plan in the fall of 2018 to ensure it meets the requirements of ABET and best addresses the engineering students. Outcomes assessment measures for each student outcome are measured on a 2 year cycle in the classes indicated in the table below.

Table 4: 2 year Assessment Plan

Semester	Student Outcome	Course	Assessment Mechanism
F 18/20	3,5	ENGR 116 (Intro Lab)	Report, Assignment
	1	ENGR 221 (Statics+ Dynamics)	Assignment
	4	ENGR 306 (Ethics)	Paper
S 19/21	1	ENGR 135 (Intro. to Elec. Circuits)	Assignment
	4,7	ENGR 390 (Junior Clinic)	Project Report, Presentation
F 19/21	4	ENGR 115 (Intro to Engineering and Physics)	Paper
	2	ENGR 116 (Intro Lab)	Design Project Report
	1	ENGR 333 (Fluid Mechanics)	Project
	4,7	ENGR 430 (Senior Clinic)	Project Report, Presentation
S 20/22	2	ENGR 350 (Economics)	Assignment
	5	ENGR 390 (Junior Clinic)	Paper
	3	ENGR 432 (Senior Clinic)	Design Project Report
	2	ENGR 430/432 (Senior Clinic)	Design Project Notebook

VI. Timeline

Begin offering in Fall 2019

VII. 4 year Degree plans

For Students Entering Fall 2019 (Starting MATH 185-Calculus I)

This is a sample schedule to illustrate how long it will take to complete this degree plan. Additional semesters may be necessary if you are required to complete courses listed in the right-hand column or if you repeat courses. Consult with your academic advisor before changing the sequence of courses. Some courses are not offered every semester and some courses have prerequisites. Check the course description in the current catalog for details. Failure to complete courses in the recommended sequence may delay graduation.

							Additional Courses	
FR Fall (15 hours)	†BIBL 101 Life and Teaching of Jesus (3)	†ENGL 111 Composition & Rhetoric (3)	†CORE 110 Cornerstone (3)	ENGR 115/116 Introduction to Engineering/Lab (3)	MATH 185 Calculus I (3)			Required if condition of Admission: UNIV 011 Learning Strategies
FR Spring (16 hours)	ENGL 112 Composition and Literature (3)	ENGR 135/136 Intro to Electronic Circuits/Lab (4)	ENGR 131 Computer Based Design (1)	PHYS 220/221 Engineering Physics I/Lab (4)	MATH 186 Calculus II (3)		ENGR Elective (1)	
SO Fall (18 hours)	BIBL102 Early Christians: Life, Literature, and Community (3)	CHEM 131/133 General Chemistry I/Lab (4)	ENGR 221 Statics and Dynamics (4)	PHYS 222/223 Engineering Physics II/Lab (4)	MATH 286 Calculus III (3)			
SO Spring (17 hours)	COMM 211 Speech and Rhetoric (3)	ENGR 377 Statistics for Engineers (3)	ENGR 332 Mechanics of Materials (3)	ENGR 281 Engineering Thermodynamics (3)	MATH 361 Ordinary Differential Equations (4)		ENGR Elective (1)	May be required based on ACT or SAT scores: MATH: MATH 109 MATH 124
JR Fall (16 or 17 hours)	Historical Literacy (3)	ENGR 333 Fluid Mechanics (3)	ENGR 370 Structural Analysis (3)	ENGR 378 Environmental Engineering or ENGR 272 Surveying + Geomatics (3)	ENGR 350 Engnr Econ (3)		ENGR 306 Engineering Ethics (1) [Take here or SR Fall; offered every other year]	ENGLISH: ENGL 003/004 ENGL 106/006 ENGL 107/007
JR Spring (17 hours)	BIBL 211 (3)	ENGR 390 Junior Clinic /Studio (3)	ENGR 376 Water Resources Engineering (3)	MATH/SCIENCE ELECTIVE *To be selected from approved list (4)	ENGR 372 Soil Mechanics or ENGR 470 Structural Design* (3)		PEAC WELLNESS OR ACTIVITY (1)	
SR Fall (14 or 15 hours)	ADVANCED BIBLE (300-499) (3)	FREE ELECTIVE (3)	ENGR 430 Senior Clinic I (3)	ENGR 378 Environmental Engineering or ENGR 272 Surveying + Geomatics (3)	PEAC WELLNESS OR ACTIVITY (1)		ENGR 306 Engineering Ethics (1) [Take here or JR Fall; offered every other year]	
SR Spring (15 hours)	ADVANCED BIBLE (300-499) (3)	LITERATURE (200-299) (3)	ENGR 432 Senior Clinic II (3)	(Cultural Awareness) PHIL 379 (3)	ENGR 372 Soil Mechanics or ENGR 470 Structural Design* (3)			Total Hours = 128

For Students Entering Fall 2019 (Starting MATH 185-Calculus I)

[illegible]

For Students Entering Fall 2019 (Starting MATH 185-Calculus I)

This is a sample schedule to illustrate how long it will take to complete this degree plan. Additional semesters may be necessary if you are required to complete courses listed in the right-hand column or if you repeat courses. Consult with your academic advisor before changing the sequence of courses. Some courses are not offered every semester and some courses have **prerequisites**. Check the course description in the current catalog for details. Failure to complete courses in the recommended sequence may delay graduation.

[illegible]

For Students Entering Fall 2019 (Starting MATH 185-Calculus I)

This is a sample schedule to illustrate how long it will take to complete this degree plan. Additional semesters may be necessary if you are required to complete courses listed in the right-hand column or if you repeat courses. Consult with your academic advisor before changing the sequence of courses. Some courses are not offered every semester and **some courses have prerequisites**. Check the course description in the current catalog for details. Failure to complete courses in the recommended sequence may delay graduation.

									Additional Courses	
FR Fall (15 hours)	†BIBL 101 Life and Teaching of Jesus (3)	†ENGL 111 Composition & Rhetoric (3)	†CORE 110 Cornerstone (3)	ENGR 115/116 Introduction to Engineering/Lab (3)	MATH 185 Calculus I (3)					Required if condition of Admission: UNIV 011 Learning Strategies
FR Spring (16 hours)	ENGL 112 Composition and Literature (3)	ENGR 135/136 Intro to Electronic Circuits/Lab (4)	ENGR 131 Computer Based Design (1)	PHYS 220/221 Engineering Physics I/Lab (4)	MATH 186 Calculus II (3)			ENGR Elective (1)		
SO Fall (18 hours)	BIBL102 Early Christians: Life, Literature, and Community (3)	CHEM 131/133 General Chemistry I/Lab (4)	ENGR 221 Statics and Dynamics (4)	PHYS 222/223 Engineering Physics II/Lab (4)	MATH 286 Calculus III (3)					
SO Spring (17 hours)	COMM 211 Speech and Rhetoric (3)	ENGR 377 Statistics for Engineers (3)	ENGR 332 Mechanics of Materials (3)	ENGR 281 Engineering Thermodynamics (3)	MATH 361 Ordinary Differential Equations (4)			ENGR Elective (1)		May be required based on ACT or SAT scores: MATH: MATH 109 MATH 124 ENGLISH: ENGL 003/004 ENGL 106/006 ENGL 107/007
JR Fall (16 or 17 hours)	Historical Literacy (3)	ENGR 333/331 Fluid Mechanics + Lab (4)	ENGR 322 Advanced Dynamics and Vibrations OR ENGR 435 Finite Element Analysis (3)	ENGR 320 Materials Science (3)	ENGR 350 Engr Econ (3)			ENGR 306 Engineering Ethics (1) [Take here or SR Fall; offered every other year]		
JR Spring (17 hours)	BIBL 211 (3)	ENGR 390 Junior Clinic /Studio (3)	ENGR 338 Design of Machine Elements OR ENGR 436 Systems and Controls (3)	MATH/SCIENCE ELECTIVE *To be selected from approved list (4)	ENGR 334 Heat and Mass Transfer (3)			PEAC WELLNESS OR ACTIVITY (1)		
SR Fall (13 or 14 hours)	ADVANCED BIBLE (300-499) (3)	FREE ELECTIVE (3)	ENGR 430 Senior Clinic I (3)	ENGR 322 Advanced Dynamics and Vibrations OR ENGR 435 Finite Element Analysis (3)	PEAC WELLNESS OR ACTIVITY (1)			ENGR 306 Engineering Ethics (1) [Take here or JR Fall; offered every other year]		
SR Spring (15 hours)	ADVANCED BIBLE (300-499) (3)	LITERATURE (200-299) (3)	ENGR 432 Senior Clinic II (3)	ENGR 338 Design of Machine Elements OR ENGR 436 Systems and Controls (3)	PHILOSOPHY 379 (3) (Cultural Awareness)					Total Hours = 128

For Students Entering Fall 2019 (Starting MATH 185-Calculus I)

This is a sample schedule to illustrate how long it will take to complete this degree plan. Additional semesters may be necessary if you are required to complete courses listed in the right-hand column or if you repeat courses. Consult with your academic advisor before changing the sequence of courses. Some courses are not offered every semester and **some courses have prerequisites**. Check the course description in the current catalog for details. Failure to complete courses in the recommended sequence may delay graduation.

[illegible]

VIII. ACU Catalog

Abilene Christian University

Engineering and Physics

Jess Dowdy, *Chair*

ACU Box 27963

Abilene, Texas 79699-7963

~~Foster Sciencee Building~~Onstead Science Center, Room ~~353~~113

Phone: 325-674-~~2165~~6539

Fax: 325-674-2146

Email: jtd10al@acu.edu

Web: <http://www.acu.edu/engineering-physics>

Tim Kennedy, Executive Director of Engineering

ACU Box 27963

Abilene, Texas 79699-7963

Onstead Science Center, Room 113

Faculty

Robert Brown, *Assistant Professor*

~~James Cutbirth, Adjunct Professor~~

Michael Daugherty, *Associate Professor*

Jess Dowdy, *Professor and Department Chair*

Jim Drachenberg, *Associate Professor*

Tim Head, *Professor*

J. Darby Hewitt, ~~Assistant~~Associate *Professor*

Lori Houghtalen, *Assistant Professor*

Donald Isenhower, *Professor*

Larry Isenhower, *Assistant Professor*

Rich Jinkerson, *Associate Professor*

Tim Kennedy, *Assistant Professor and Executive Director of Engineering*

Scott Marshall, *Assistant Professor*

Ray Smith, *Engineering Lab Supervisor*

Rusty Towell, *Professor*

The Department of Engineering and Physics offers two different degrees: a Bachelor of Science (BS) degrees and a Bachelor of Science in Engineering (BSE) degree. The BS degrees are awarded for majors in Physics and Physics and Math Teaching. The Physics major has five tracks: Physics (PHYS), Engineering Science Technology (PHYA), Engineering Physics (PHYN), Medical Physics (PHYM) and Computational Physics (PHYC).

The BSE degree is awarded for the Engineering major. The BSE degree is an integrated general engineering program offering.

the following concentrations:

- Civil Engineering (CE)
- Electrical Engineering (EE)
- General Engineering (GE)
- Industrial Engineering (IE)
- Mechanical Engineering (ME)

The engineering program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>. The department works with the Department of Teacher Education and the Department of Chemistry and Biochemistry to offer teacher certification in physical and composite science (see the [Chemistry and Biochemistry](#) section of this catalog). A minor in engineering science or physics may be added to other majors.

Introduction

Abilene Christian University

2020 Catalog

~~2018~~2019~~-2019~~

Engineering, ~~BSE (ENGR)~~

Abilene Christian University offers a Bachelor of Science in Engineering degree (BSE) with concentrations in civil, electrical, industrial, and mechanical engineering. The engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

General Departmental Requirements

Engineering majors must develop mathematical skills as well as design, experimental, and computational abilities. If the student does not qualify to take ~~Pre~~Calculus II Calculus I (MATH 12485) when the student enters ACU, his or her graduation may be delayed.

Program Educational Objectives

The ACU engineering program strongly supports the university's mission of educating students for Christian service and leadership throughout the world. In support of the university mission and in response to the needs of program constituents, the Program Educational Objectives (PEOs) are that within a few years of graduation:

1. Alumni are succeeding in engineering practice or other diverse fields that value analytical, problem solving, and professional practice skills.
2. Alumni are engaging in life-long learning that builds upon foundational knowledge acquired in their undergraduate education through graduate study, career-specific training, or other professional training.
3. Alumni are glorifying God through thoughtful integration of work and life, facilitating service to others through their profession.

Student Outcomes

The following student outcomes will prepare ACU engineering students to attain the program educational objectives:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- A recognition of the need for and an ability to engage in life-long learning.
- A knowledge of contemporary issues.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Engineering, General, BSE (ENGR-GE)

University Requirements

Please see the [University Requirements](#) section of this catalog.

Major Requirements

Chemistry

- [CHEM 133 - General Chemistry I](#) Credit Hours: 3
- [CHEM 131 - General Chemistry Laboratory I](#) Credit Hours: 1

Engineering

- [ENGR 115 - Introduction to Engineering and Physics](#) Credit Hours: 2
- [ENGR 116 - Introduction to Engineering and Physics Laboratory](#) Credit Hours: 1
- [ENGR 131 - Computer Aided Design and Modeling](#) Credit Hours: 3
- [ENGR 135 - Introduction to Electric Circuits](#) Credit Hours: 3
- [ENGR 136 - Introduction to Electric Circuits Laboratory](#) Credit Hours: 1
- [ENGR 221 - Statics and Dynamic](#) Credit Hours: 4
- [ENGR 220 - Engineering Mechanics: Statics](#) Credit Hours: 3
- [ENGR 222 - Engineering Mechanics: Dynamics](#) Credit Hours: 3
- [ENGR 281 - Engineering Thermodynamics](#) Credit Hours: 3
- [ENGR 305 - Environmental Health and Safety for Engineers](#) Credit Hours: 2
- [ENGR 306 - Engineering Ethics](#) Credit Hours: 1
- [ENGR 333 - Fluid Mechanics](#) Credit Hours: 3
- [ENGR 342 - Measurement Techniques](#) Credit Hours: 3
- [ENGR 343 - Measurement Techniques Laboratory](#) Credit Hours: 1
- [ENGR 350 - Engineering Economics](#) Credit Hours: 3 *
- [ENGR 377 - Engineering Statistics](#) Credit Hours: 3
- [ENGR 390 - Junior Clinic](#) Credit Hours: 3
- [ENGR 430 - Senior Clinic I](#) Credit Hours: 3 (capstone course)
- [ENGR 432 - Senior Clinic II](#) Credit Hours: 3 (capstone & writing-intensive course)
- [ENGR Elective](#) Credit Hours: 2

*Hours may also fulfill university requirements and are not included in total major hours

General Concentration Electives

- [ENGR 320 - Materials Science](#) Credit Hours: 3
- [ENGR 332 - Mechanics of Materials](#) Credit Hours: 3

Mathematics

- [MATH 185 - Calculus I](#) Credit Hours: 3 *
- [MATH 186 - Calculus II](#) Credit Hours: 3
- [MATH 286 - Calculus III](#) Credit Hours: 3
- [MATH 361 - Ordinary Differential Equations](#) Credit Hours: 4

*Hours may also fulfill university requirements and are not included in total major hours

Math/Science Selections

Choose 3 hours from the following:

- [MATH 187 - Calculus Computer Laboratory](#) Credit Hours: 1
- [MATH 325 - Linear Algebra](#) Credit Hours: 3
- [MATH 341 - Numerical Methods](#) Credit Hours: 3
- [MATH 377 - Statistical Methods I](#) Credit Hours: 3
- [MATH 463 - Partial Differential Equations](#) Credit Hours: 3
- [BIOL 112 - General Biology I](#) Credit Hours: 3 or above (excluding 203);
- [CHEM 114 - Introductory Organic and Biological Chemistry](#) Credit Hours: 3 or above (excluding 203);
- [PHYS above 331-330 or above](#) (excluding [PHYS 342/PHYS 343](#), [PHYS 379](#), [PHYS 388](#), [and PHYS 401](#), and [PHYS 499](#))

Philosophy

- [PHIL 379 - Philosophy, Religion and Science](#) Credit Hours: 3 *

*Hours may also fulfill university requirements and are not included in total major hours

Physics

- [PHYS 220 - Engineering Physics I](#) Credit Hours: 3 *
- [PHYS 221 - Engineering Physics I Laboratory](#) Credit Hours: 1
- [PHYS 222 - Engineering Physics II](#) Credit Hours: 3 *
- [PHYS 223 - Engineering Physics II Laboratory](#) Credit Hours: 1
- [PHYS 330 - Modern Physics](#) Credit Hours: 3 *
- [PHYS 331 - Modern Physics Laboratory](#) Credit Hours: 1

*Hours may also fulfill university requirements and are not included in total major hours

General Engineering Electives

[ENGR 200-498](#) Credit Hours 6

[ENGR 300-498](#) Credit Hours: 10

Electives

Minimum - 0 Credit Hours

Total Major Hours: 72

Other Graduation Requirements

Minimum grade for PHYS or ENGR: C

Minimum GPA for graduation: 2.00

Minimum advanced hours: 33

Minimum total hours: 128

*Courses numbered 0** do not count in minimum hours required for degree.*

Engineering, Civil, BSE (ENGR-CE)

University Requirements

Please see the [University Requirements](#) section of this catalog.

Major Requirements

Chemistry

- [CHEM 133 - General Chemistry I](#) Credit Hours: 3
- [CHEM 131 - General Chemistry Laboratory I](#) Credit Hours: 1

Engineering

- [ENGR 115 - Introduction to Engineering and Physics](#) Credit Hours: 2
- [ENGR 116 - Introduction to Engineering and Physics Laboratory](#) Credit Hours: 1
- [ENGR 131 - Computer Aided Design and Modeling](#) Credit Hours: 1
- [ENGR 135 - Introduction to Electric Circuits](#) Credit Hours: 3
- [ENGR 136 - Introduction to Electric Circuits Laboratory](#) Credit Hours: 1
- [ENGR 221 - Statics and Dynamics](#) Credit Hours: 4
- [ENGR 281 - Engineering Thermodynamics](#) Credit Hours: 3
- [ENGR 306 - Engineering Ethics](#) Credit Hours: 1
- [ENGR 333 - Fluid Mechanics](#) Credit Hours: 3
- [ENGR 350 - Engineering Economics](#) Credit Hours: 3*
- [ENGR 377 - Engineering Statistics](#) Credit Hours: 3
- [ENGR 390 - Junior Clinic](#) Credit Hours: 3
- [ENGR 430 - Senior Clinic I](#) Credit Hours: 3 (capstone course)
- [ENGR 432 - Senior Clinic II](#) Credit Hours: 3 (capstone & writing-intensive course)
- [ENGR Elective](#) Credit Hours: 2

*Hours may also fulfill university requirements and are not included in total major hours

Civil Concentration Electives (CE)

Choose 19 hours from the following courses

- [ENGR 272 - Surveying and Geomatics](#) Credit Hours: 3
- [ENGR 332 - Mechanics of Materials](#) Credit Hours: 3
- [ENGR 370 - Structural Analysis](#) Credit Hours: 3
- [ENGR 372 - Soil Mechanics](#) Credit Hours: 3
- [ENGR 373 - Engineering Field Methods Laboratory](#) Credit Hours: 1
- [ENGR 376 - Water Resources Engineering](#) Credit Hours: 3
- [ENGR 378 - Introduction to Environmental Engineering](#) Credit Hours: 3
- [ENGR 470 - Design of Structures](#) Credit Hours: 3

Mathematics

- [MATH 185 - Calculus I](#) Credit Hours: 3 *
- [MATH 186 - Calculus II](#) Credit Hours: 3
- [MATH 286 - Calculus III](#) Credit Hours: 3
- [MATH 361 - Ordinary Differential Equations](#) Credit Hours: 4

*Hours may also fulfill university requirements and are not included in total major hours

Math/Science Selections

Choose 3 hours from the following:

- [MATH 187 - Calculus Computer Laboratory](#) Credit Hours: 1
- [MATH 325 - Linear Algebra](#) Credit Hours: 3
- [MATH 341 - Numerical Methods](#) Credit Hours: 3
- [MATH 463 - Partial Differential Equations](#) Credit Hours: 3
- [BIOL 112 - General Biology I](#) Credit Hours: 3 or above (excluding 203);
- [CHEM 114 - Introductory Organic and Biological Chemistry](#) Credit Hours: 3 or above (excluding 203);
- PHYS 330 or above (excluding, [PHYS 379](#), [PHYS 388](#), [PHYS 401](#), and [PHYS 499](#))

Philosophy

- [PHIL 379 - Philosophy, Religion and Science](#) Credit Hours: 3 *

*Hours may also fulfill university requirements and are not included in total major hours

Physics

- [PHYS 220 - Engineering Physics I](#) Credit Hours: 3 *
- [PHYS 221 - Engineering Physics I Laboratory](#) Credit Hours: 1
- [PHYS 222 - Engineering Physics II](#) Credit Hours: 3 *
- [PHYS 223 - Engineering Physics II Laboratory](#) Credit Hours: 1

*Hours may also fulfill university requirements and are not included in total major hours

Civil Engineering Electives

ENGR 300-498 Credit Hours: 3

Electives

Minimum - 0 Credit Hours

Total Major Hours: 72

Other Graduation Requirements

Minimum grade for PHYS or ENGR: C

Minimum GPA for graduation: 2.00

Minimum advanced hours: 33

Minimum total hours: 128

Engineering, Electrical, BSE (ENGR-EE)

University Requirements

Please see the [University Requirements](#) section of this catalog.

Major Requirements

Chemistry

- [CHEM 133 - General Chemistry I](#) Credit Hours: 3
- [CHEM 131 - General Chemistry Laboratory I](#) Credit Hours: 1

Engineering

- [ENGR 115 - Introduction to Engineering and Physics](#) Credit Hours: 2
- [ENGR 116 - Introduction to Engineering and Physics Laboratory](#) Credit Hours: 1
- [ENGR 131 - Computer Aided Design and Modeling](#) Credit Hours: 1
- [ENGR 135 - Introduction to Electric Circuits](#) Credit Hours: 3
- [ENGR 136 - Introduction to Electric Circuits Laboratory](#) Credit Hours: 1
- [ENGR 221 - Statics and Dynamics](#) Credit Hours: 4
- [ENGR 281 - Engineering Thermodynamics](#) Credit Hours: 3
- [ENGR 306 - Engineering Ethics](#) Credit Hours: 1
- [ENGR 333 - Fluid Mechanics](#) Credit Hours: 3
- [ENGR 350 - Engineering Economics](#) Credit Hours: 3*
- [ENGR 377 - Engineering Statistics](#) Credit Hours: 3
- [ENGR 390 - Junior Clinic](#) Credit Hours: 3
- [ENGR 430 - Senior Clinic I](#) Credit Hours: 3 (capstone course)
- [ENGR 432 - Senior Clinic II](#) Credit Hours: 3 (capstone & writing-intensive course)
- [ENGR Elective](#) Credit Hours: 2

*Hours may also fulfill university requirements and are not included in total major hours

Electrical Concentration Electives (EE)

Choose 19 hours from the following courses

- [ENGR 210 - Digital Logic](#) Credit Hours: 3
- [ENGR 355 - Electronic Devices](#) Credit Hours: 3
- [ENGR 356 - Electronic Devices Lab](#) Credit Hours: 1
- [ENGR 360 - Electricity and Magnetism](#) Credit Hours: 3
- [ENGR 387 - Power Electronics and Electromechanics](#) Credit Hours: 3
- [ENGR 388 - Network Analysis](#) Credit Hours: 3
- [ENGR 410 - Signal Processing](#) Credit Hours: 3
- [ENGR 422 - Embedded Systems](#) Credit Hours: 3
- [ENGR 423 - Embedded Systems Lab](#) Credit Hours: 1

Mathematics

- [MATH 185 - Calculus I](#) Credit Hours: 3 *
- [MATH 186 - Calculus II](#) Credit Hours: 3

- Program: Engineering, BSE (ENGR) - Abilene Christian University - Acalog ACMS™
- [MATH 286 - Calculus III](#) Credit Hours: 3
- [MATH 361 - Ordinary Differential Equations](#) Credit Hours: 4

*Hours may also fulfill university requirements and are not included in total major hours

Math/Science Selections

Choose 3 hours from the following:

- [MATH 187 - Calculus Computer Laboratory](#) Credit Hours: 1
- [MATH 325 - Linear Algebra](#) Credit Hours: 3
- [MATH 341 - Numerical Methods](#) Credit Hours: 3
- [MATH 463 - Partial Differential Equations](#) Credit Hours: 3
- [BIOL 112 - General Biology I](#) Credit Hours: 3 or above (excluding 203);
- [CHEM 114 - Introductory Organic and Biological Chemistry](#) Credit Hours: 3 or above (excluding 203);
- PHYS 330 or above (excluding, [PHYS 379](#), [PHYS 388](#), [PHYS 401](#), and [PHYS 499](#))

Philosophy

- [PHIL 379 - Philosophy, Religion and Science](#) Credit Hours: 3 *

*Hours may also fulfill university requirements and are not included in total major hours

Physics

- [PHYS 220 - Engineering Physics I](#) Credit Hours: 3 *
- [PHYS 221 - Engineering Physics I Laboratory](#) Credit Hours: 1
- [PHYS 222 - Engineering Physics II](#) Credit Hours: 3 *
- [PHYS 223 - Engineering Physics II Laboratory](#) Credit Hours: 1

*Hours may also fulfill university requirements and are not included in total major hours

Electrical Engineering Electives

ENGR 300-498 Credit Hours: 3

Electives

Minimum - 0 Credit Hours

Total Major Hours: 72

Other Graduation Requirements

Minimum grade for PHYS or ENGR: C

Minimum GPA for graduation: 2.00

Minimum advanced hours: 33

Minimum total hours: 128

*Courses numbered 0** do not count in minimum hours required for degree.*

Engineering, Industrial, BSE (ENGR-IE)

University Requirements

Please see the [University Requirements](#) section of this catalog.

Major Requirements

Chemistry

- [CHEM 133 - General Chemistry I](#) Credit Hours: 3
- [CHEM 131 - General Chemistry Laboratory I](#) Credit Hours: 1

Engineering

- [ENGR 115 - Introduction to Engineering and Physics](#) Credit Hours: 2
- [ENGR 116 - Introduction to Engineering and Physics Laboratory](#) Credit Hours: 1
- [ENGR 131 - Computer Aided Design and Modeling](#) Credit Hours: 1
- [ENGR 135 - Introduction to Electric Circuits](#) Credit Hours: 3
- [ENGR 136 - Introduction to Electric Circuits Laboratory](#) Credit Hours: 1
- [ENGR 221 - Statics and Dynamics](#) Credit Hours: 4
- [ENGR 281 - Engineering Thermodynamics](#) Credit Hours: 3
- [ENGR 306 - Engineering Ethics](#) Credit Hours: 1
- [ENGR 333 - Fluid Mechanics](#) Credit Hours: 3
- [ENGR 350 - Engineering Economics](#) Credit Hours: 3*
- [ENGR 377 - Engineering Statistics](#) Credit Hours: 3
- [ENGR 390 - Junior Clinic](#) Credit Hours: 3
- [ENGR 430 - Senior Clinic I](#) Credit Hours: 3 (capstone course)
- [ENGR 432 - Senior Clinic II](#) Credit Hours: 3 (capstone & writing-intensive course)
- [ENGR Elective](#) Credit Hours: 2

*Hours may also fulfill university requirements and are not included in total major hours

Industrial Concentration Electives (IE)

Choose 19 hours from following courses:

- [ENGR 251 - Management Engineering](#) Credit Hours: 3
- [ENGR 320 - Materials Science](#) Credit Hours: 3
- [ENGR 321 - Manufacturing Processes Lab](#) Credit Hours: 1
- [ENGR 332 - Mechanics of Materials](#) Credit Hours: 3
- [ENGR 351 - Statistical Quality Control](#) Credit Hours: 3
- [ENGR 352 - Engineering Optimization](#) Credit Hours: 3
- [ENGR 353 - Management Systems and Production Planning](#) Credit Hours: 3
- [ENGR 450 - Simulation](#) Credit Hours: 3

Mathematics

- [MATH 185 - Calculus I](#) Credit Hours: 3 *
- [MATH 186 - Calculus II](#) Credit Hours: 3
- [MATH 286 - Calculus III](#) Credit Hours: 3

- Program: Engineering, BSE (ENGR) - Abilene Christian University - Acalog ACMS™
- [MATH 361 - Ordinary Differential Equations](#) Credit Hours: 4

*Hours may also fulfill university requirements and are not included in total major hours

Math/Science Selections

Choose 3 hours from the following:

- [MATH 187 - Calculus Computer Laboratory](#) Credit Hours: 1
- [MATH 325 - Linear Algebra](#) Credit Hours: 3
- [MATH 341 - Numerical Methods](#) Credit Hours: 3
- [MATH 463 - Partial Differential Equations](#) Credit Hours: 3
- [BIOL 112 - General Biology I](#) Credit Hours: 3 or above (excluding 203);
- [CHEM 114 - Introductory Organic and Biological Chemistry](#) Credit Hours: 3 or above (excluding 203);
- PHYS 330 or above (excluding, [PHYS 379](#), [PHYS 388](#), [PHYS 401](#), and [PHYS 499](#))

Philosophy

- [PHIL 379 - Philosophy, Religion and Science](#) Credit Hours: 3 *

*Hours may also fulfill university requirements and are not included in total major hours

Physics

- [PHYS 220 - Engineering Physics I](#) Credit Hours: 3 *
- [PHYS 221 - Engineering Physics I Laboratory](#) Credit Hours: 1
- [PHYS 222 - Engineering Physics II](#) Credit Hours: 3 *
- [PHYS 223 - Engineering Physics II Laboratory](#) Credit Hours: 1

*Hours may also fulfill university requirements and are not included in total major hours

Industrial Engineering Electives

ENGR 300-498 Credit Hours: 3

Electives

Minimum - 0 Credit Hours

Total Major Hours: 72

Other Graduation Requirements

Minimum grade for PHYS or ENGR: C

Minimum GPA for graduation: 2.00

Minimum advanced hours: 33

Minimum total hours: 128

*Courses numbered 0** do not count in minimum hours required for degree.*

Engineering, Mechanical, BSE (ENGR-ME)

University Requirements

Please see the [University Requirements](#) section of this catalog.

Major Requirements

Chemistry

- [CHEM 133 - General Chemistry I](#) Credit Hours: 3
- [CHEM 131 - General Chemistry Laboratory I](#) Credit Hours: 1

Engineering

- [ENGR 115 - Introduction to Engineering and Physics](#) Credit Hours: 2
- [ENGR 116 - Introduction to Engineering and Physics Laboratory Credit](#) Hours: 1
- [ENGR 131 - Computer Aided Design and Modeling](#) Credit Hours: 1
- [ENGR 135 - Introduction to Electric Circuits](#) Credit Hours: 3
- [ENGR 136 - Introduction to Electric Circuits Laboratory](#) Credit Hours: 1
- [ENGR 221 - Statics and Dynamics](#) Credit Hours: 4
- [ENGR 281 - Engineering Thermodynamics](#) Credit Hours: 3
- [ENGR 306 - Engineering Ethics](#) Credit Hours: 1
- [ENGR 333 - Fluid Mechanics](#) Credit Hours: 3
- [ENGR 350 - Engineering Economics](#) Credit Hours: 3*
- [ENGR 377 - Engineering Statistics](#) Credit Hours: 3
- [ENGR 390 - Junior Clinic](#) Credit Hours: 3
- [ENGR 430 - Senior Clinic I](#) Credit Hours: 3 (capstone course)
- [ENGR 432 - Senior Clinic II](#) Credit Hours: 3 (capstone & writing-intensive course)
- [ENGR Elective](#) Credit Hours: 2

*Hours may also fulfill university requirements and are not included in total major hours

Mechanical Concentration Electives (ME)

Choose 19 hours from following courses.

- [ENGR 320 - Materials Science](#) Credit Hours: 3
- [ENGR 322 - Advanced Dynamics and Vibrations](#) Credit Hours: 3
- [ENGR 331 - Fluid Mechanics Lab](#) Credit Hours: 1
- [ENGR 332 - Mechanics of Materials](#) Credit Hours: 3
- [ENGR 334 - Heat and Mass Transfer](#) Credit Hours: 3
- [ENGR 338 - Design of Machine Elements](#) Credit Hours: 3
- [ENGR 435 - Finite Element Analysis](#) Credit Hours: 3
- [ENGR 436 - Systems and Controls](#) Credit Hours: 3

Mathematics

- [MATH 185 - Calculus I](#) Credit Hours: 3 *
- [MATH 186 - Calculus II](#) Credit Hours: 3
- [MATH 286 - Calculus III](#) Credit Hours: 3
- [MATH 361 - Ordinary Differential Equations](#) Credit Hours: 4

*Hours may also fulfill university requirements and are not included in total major hours

Math/Science Selections

Choose 3 hours from the following:

- [MATH 187 - Calculus Computer Laboratory](#) Credit Hours: 1
- [MATH 325 - Linear Algebra](#) Credit Hours: 3
- [MATH 341 - Numerical Methods](#) Credit Hours: 3
- [MATH 463 - Partial Differential Equations](#) Credit Hours: 3
- [BIOL 112 - General Biology I](#) Credit Hours: 3 or above (excluding 203);
- [CHEM 114 - Introductory Organic and Biological Chemistry](#) Credit Hours: 3 or above (excluding 203);
- PHYS 330 or above (excluding, [PHYS 379](#), [PHYS 388](#), [PHYS 401](#), and [PHYS 499](#))

Philosophy

- [PHIL 379 - Philosophy, Religion and Science](#) Credit Hours: 3 *

*Hours may also fulfill university requirements and are not included in total major hours

Physics

- [PHYS 220 - Engineering Physics I](#) Credit Hours: 3 *
- [PHYS 221 - Engineering Physics I Laboratory](#) Credit Hours: 1
- [PHYS 222 - Engineering Physics II](#) Credit Hours: 3 *
- [PHYS 223 - Engineering Physics II Laboratory](#) Credit Hours: 1

*Hours may also fulfill university requirements and are not included in total major hours

Mechanical Engineering Electives

ENGR 300-498 Credit Hours: 3

Electives

Minimum - 0 Credit Hours

Total Major Hours: 72

Other Graduation Requirements

Minimum grade for PHYS or ENGR: C

Minimum GPA for graduation: 2.00

Minimum advanced hours: 33

Minimum total hours: 128

*Courses numbered 0** do not count in minimum hours required for degree.*

Fwd: ENGR degree modifications

Timothy Kennedy <tjk14a@acu.edu>
To: jes98k@acu.edu

Wed, Nov 7, 2018 at 2:23 PM

FYI

Begin forwarded message:

From: Mark McCallon <mccallonm@acu.edu>
Date: November 7, 2018 at 2:16:21 PM CST
To: Tim Kennedy <timothy.kennedy@acu.edu>
Subject: Re: ENGR degree modifications

Thanks, Tim. After reviewing all of the course applications and syllabi, the library can support the degree modifications.

Mark McCallon
ACU Library
mccallonm@acu.edu

On Wed, Nov 7, 2018 10:58 AM, Tim Kennedy timothy.kennedy@acu.edu wrote:

Mark,

As you are probably aware due to the significant number of courses proposals coming to you over the last month, we are proposing adding concentrations in engineering within the BSE degree. I wanted to pass on the report so that you could be aware and make sure the library is able to support.

Thank you for all your work as we have prepared these courses.

Let me know if you have any questions.
Kind Regards,

Tim Kennedy, PhD, PE
Executive Director of Engineering
Assistant Professor of Engineering and Physics
Abilene Christian University
Phone: (325) 674-2854

Mark McCallon
Abilene Christian University Library
mccallonm@acu.edu