

Abilene Approval Chart for Curriculum Changes

A = Approve I = Information Item R = Respond in Writing

Course Number _____ or Degree Plan(s) B.S. in Mechanical Engineering
 State the requested change and reason. A memo may be attached if more space is necessary.

I

The Mechanical Engineering degree is a natural outgrowth of the existing Mechanical Concentration of the current Engineering degree. The additional specificity will aid students in obtaining jobs while simultaneously helping recruiting efforts to grow our student body.

Indicate the requested change.

	Change to a Course	Dept./School ¹	College	Dean	TEC	UGEC	AUAC/Grad	Provost	President
1.	Title (description unchanged)	A	A	A	I	–	I	I	I
2.	Description (not affecting content)	A	A	A	I	–	I	I	I
3.	Course term(s)	A	I	A	I	–	I	I	I
4.	Content (change of course outcomes)	A	A	A	I	–	I	A	I
5.	Number of hours (lecture, lab, contact)	A	A	A	A	–	A	A	I
6.	Course number within the hundred	A	A	I	I	–	I	I	I
7.	Course number beyond the hundred	A	A	A	A	–	A	A	I
8.	Prerequisites	A	A	A	I	–	I	I	I
9.	Course fee(s)	A	–	A	–	–	–	A	I
10.	From U to G <i>or</i> G to U	A	A	A	A	–	A	A	I
11.	Cross-list course	A	A	A	A	–	A	A	I
12.	Department of record	A	A	A	A	–	A	A	I
13.	Close a course	A	A	A	A	–	A	A	I
14.	New course (includes combining or splitting courses)	A	A	A	A	–	A	A	I

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	Change to the University Requirements (All Campuses)	Dept./School¹	College	Dean	TEC	UGEC	AUAC/Grad	Provost	Faculty	President	Trustees
1.	University Requirements — Change course outcomes of an included course ²	A	A	A	–	A	–	A	–	A	–
2.	University Requirements — Add or drop a required course from the University Requirements ²	A	A	A	–	A	–	A	A	A	–
3.	University Requirements — Add or drop a course from a menu within the University Requirements ²	A	–	–	–	A	–	A	–	A	–
4.	University Requirements — Change hours within a menu in the University Requirements ²	A	A	A	–	A	–	A	A	A	–
	Change to Catalog Information (for Campus)										
1.	General Requirements for Bachelor's Degrees and Associate's Degrees	–	–	–	–	–	A	A	A	A	–
2.	Policies governing academic probation and suspension	–	–	–	–	–	A	A	A	A	–
3.	Requirements for graduating with honors	–	–	–	–	–	A	A	A	A	–
	Change to a Degree Plan Proposed by Faculty or College										
5.	Educational Program — Revise ³	A	A	A	A	–	A	A	–	A	–
6.	Educational Program — Adopt/change admission requirements	A	A	A	A	–	A	A	–	A	–
7.	Educational Program — Add ³	A	A	A	A	–	A	A	A	A	I
8.	Educational Program — Discontinue	A	A	A	A	–	A	A	A	A	I
9.	GPA — Revise program-required GPAs	A	A	A	A	–	A	A	–	A	–
10.	Minor — Revise	A	A	A	I	–	I	I	–	I	–
11.	Minor — Add	A	A	A	A	–	A	A	–	A	–
12.	Minor — Discontinue	A	A	A	A	–	A	A	–	A	–
13.	Degree — Add	A	A	A	A	–	A	A	A	A	I
14.	Degree — Discontinue	A	A	A	A	–	A	A	A	A	I
	Change to a Degree Plan Proposed By Provost										
15.	Educational Program — Discontinue	R	–	R	A	–	A	A	A	A	I
16.	Minor — Discontinue	R	–	R	A	–	A	A	–	A	–
17.	Degree — Discontinue	R	–	R	A	–	A	A	A	A	I

¹ 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.

² Courses that satisfy ACU's University Requirements 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.

³ For undergraduate majors, a minimum of 30 hours is required. These programs must have a minimum of 6 elective hours, unless the requirements of external accrediting bodies make it impossible.

Department/School Chair(s)	
 Signature	9/11/23 Approval date
_____ Signature	_____ Approval date

College Academic Council(s)	
Charles Smitschke Signature	9/14/2023 Approval date
_____ Signature	_____ Approval date

Dean(s)	
Charles Smitschke Signature	9/14/2023 Approval date
_____ Signature	_____ Approval date

Teacher Education Council	
_____ Chair's signature	_____ Approval date

University General Education Council	
_____ Chair's signature	_____ Approval date

Abilene 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

Department/School Chair(s)	
	9/11/23
Signature	Approval date
Signature	Approval date

College Academic Council(s)	
Charles M. Smith	9/14/2023
Signature	Approval date
Signature	Approval date

Dean(s)	
Signature	Approval date
Signature	Approval date

Teacher Education Council	
Chair's signature	Approval date

University General Education Council	
Chair's signature	Approval date

Abilene 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



MECHANICAL ENGINEERING

Program Application

Dr. Robert Brown

A. Executive Summary

Currently, ACU has a Bachelor of Science in Engineering degree with four different concentrations: Civil, Electrical, General, and Mechanical Engineering. By creating a specific Mechanical Engineering degree, a number of benefits are expected including recruiting, retention and employment opportunities. As a result, we expect better communication and more interest with prospective students, their parents, and prospective employers and thus growth of the engineering program as a whole.

Additional faculty in Mechanical Engineering would provide the level of margin necessary to account for expected growth in the program. Also, a common trend of Mechanical Engineering programs is the presence of concentrations, which allow for greater specificity in the very broad degree. Addition of concentrations within the Mechanical Engineering degree would be useful for recruiting and provide courses that many students have already been requesting.

Concentrations that could be supported include Aerospace Engineering, Mechatronics, Nuclear Engineering, Systems and Design, Petroleum Engineering and Thermal Fluid Systems.

1. Program Identification

A. Program Title

Mechanical Engineering

B. Degree Type

Bachelor of Science

C. Home Department

Department of Engineering and Physics

D. Program Developers and Credentials

Robert Brown – Ph.D. in Aerospace Engineering, Associate Professor of Engineering

E. Location and Delivery Method

The program will be residential on the Abilene campus. All courses will be offered face-to-face, with no plans for alternative delivery.

F. Proposed Date of Implementation

The program could begin as early as Fall 2024, with initial graduates expected Spring 2025. Many of the required courses are already being offered as electives to fulfill the Mechanical Concentration of the Bachelor of Science in Engineering (BSE). With a planned delivery date of Fall 2024, students could be advised into appropriate courses prior to the full implementation of the degree program.

2. Program Details

A. Program Description

The Bachelor of Science in Mechanical Engineering is a diverse and challenging discipline. Mechanical Engineering is a culmination of math, science and business principles. Mechanical Engineering students study various subjects like energy transfer to mechanical design to the understanding of aeronautical principles. Mechanical Engineering students can branch out into concentrations including mechatronics or robotics and nuclear engineering which will enhance recruiting efforts. Students will learn to identify and solve modern day problems, develop professional skills, and communicate more effectively.

B. Program Mission Statement

The mission of the Abilene Christian University Department of Engineering and Physics is to prepare students to become engineering professionals with a drive for Christian service and leadership throughout the world.

The Mechanical Engineering program will fulfill the mission of the Department of Engineering and Physics, with special emphasis on creating engineering professionals in the field of Mechanical Engineering.

C. Program Outcomes

The following Program Educational Outcomes (PEOs) will be achieved 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.

The following Student Outcomes were adopted from ABET in support of the PEOs.

A graduate of the Mechanical Engineering Program at ACU should obtain:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. 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.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

D. Target Audience

The Bachelor of Science in Mechanical Engineering is designed for individuals interested in developing math and science skills with a focus on mechanical application. The target audience consists of students with a strong foundation in mathematics and science. They possess an eye for detail, enjoy problem-solving, and have a desire to make a positive impact on society.

Creativity is also valued in mechanical engineering, as students are required to find innovative solutions while considering factors such as safety, sustainability, and efficiency. Mechanical engineering is a broad field, and students may find their niche in simulation, design and optimization, project management, product testing and quality control, or a number of other sub-disciplines.

Mechanical engineering is a practical discipline, with a focus on application, and will appeal to students who wish to make an impact on real-world problems.

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.

F. Projected Total Enrollment

Seventy-five (75) to one hundred (100) students total each year, starting in Fall 2024.

G. CIP Code

14.1901 – Mechanical Engineering

3. Rationale and Need for New Program

A. Mission and Vision Fit

Our goal is to be recognized academically by industry as a premier undergraduate engineering program. Mechanical Engineering is one of the top engineering disciplines and will attract students, which will aid in undergraduate growth for the university. Mechanical Engineering will allow students to be engaged in a larger variety of activities compared to a General Engineering degree. This develops the student to further their knowledge in areas of interest thus making them more marketable in career prospects and internships.

B. Societal Need

Industry is seeking highly skilled individuals. Through a rigorous Mechanical Engineering curriculum, the student will master problem solving techniques. Society is demanding more accessible technology and a safer environment. Engineers are first and foremost to be concerned about the safety and welfare of society and the general public. Mechanical engineers are immersed in the understanding of mechanical devices and the complexity of mechanical engineering problems.

In the post-pandemic world of 2020, the value of mechanical engineers to our society became illuminating with solutions to healthcare issues. Mechanical engineers have collaborated with the healthcare industry to develop technologies that support physicians and humanity as a whole. Medical devices, individualized medications, and surgical instruments have all been produced by mechanical engineers using 3D printing technology.

Mechanical engineers improve the global supply chain and scale up therapeutics in addition to helping with production. Mechanical engineers are increasingly involved in the design, development, manufacturing, and testing of hybrid electric vehicles as electric vehicle technology advances in the automotive industry.

Mechanical engineers are involved in power generation. In recent years, they have made significant contributions to the development of renewable energy infrastructure around the world, ranging from large solar projects to using wind, ocean, or tidal energy to generate power. They are also involved in space exploration, climate change, sensor and controller integration, and many other areas. Mechanical engineers and computer scientists are collaborating in the Industry 4.0 era to make machines communicate without the need for human intervention, preserving the possibility of developing a smart factory.

Mechanical Engineers contribute to society by using their skills to improve the safety, security, efficiency, and comfort of the systems and devices that society relies on every day.

C. Employment Demand and Career Possibilities

By examining employment projection data from the Bureau of Labor and Statistics (BLS) for both the US (for 2021-2031). Data indicates that the job outlook and demand is good for the US, and especially promising for Texas.

National projection data (<https://www.bls.gov/ooh/architecture-and-engineering/mechanical-engineers.htm>)

Texas projection data from PMP (<https://projectionscentral.org>)

Mechanical Engineering	National – 2021	Texas – 2022-2024	Texas – 2020-2030
Number of Jobs	284,900	20,670	21,100
Job Outlook	2%	6.6%	19.2%
Employment Change	6,400	1,360	4,060

As of May 2022, the median annual pay for a Mechanical Engineer in Texas is \$99,400, compared to \$95,300 nationwide. The growth for mechanical engineers in Texas is expected to be 9.19% in the next 10 years.

Despite limited employment growth, about 17,900 openings for mechanical engineers are projected each year, on average, over the decade. Most of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force.

D. Prospective Student Interest

Current graduation rates by discipline were examined to determine how large the student pool would be. Further, the data (Yoder, “Engineering by the Numbers”, ASEE, 2021) indicated that a student’s top interest (based upon number of graduates) is in Mechanical Engineering. Graduating students desire more depth in specific disciplines. Mechanical Engineers are the most sought-after Engineering degree.

Table 1: Bachelor's Degrees by Discipline: 146,233*

Discipline Name	Degrees Awarded
Mechanical	34,781
Computer Sci. (inside Eng.)	23,732
Computer Sci. (outside Engr.)	15,430
Civil	13,586
Electrical	13,495
Chemical	9,872
Computer	8,244
Biomedical	8,165
Industrial/Manufacturing/Systems	7,496
Other	7,231
Aerospace	5,166
Electrical/Computer	3,700
Engineering (General)	1,988
Metallurgical and Matrls.	1,841
Civil/Environmental	1,457
Biological and Agricultural	1,310
Envr. Eng	1,181
Petroleum	708
Engr. Science and Engr. Physics	689
Architectural	681
Nuclear	384
Engineering Management	375
Mining	151

* Total does not include computer science (outside engineering).

Table 31: Undergraduate Enrollment by Engineering Discipline: 586,589

Discipline Name	Enrollments
Mechanical	124,130
Computer Sci. (inside Eng.)	103,088
Other	53,418
Civil	46,763
Electrical	44,096
Computer Sci. (outside Engr.)	42,206
Biomedical	33,326
Chemical	33,164
Computer	31,533
Engineering (General)	26,004
Aerospace	22,805
Industrial/Manufacturing/Systems	20,186
Electrical/Computer	14,715
Envr. Eng	6,079
Civil/Environmental	5,795
Metallurgical and Matrls.	5,415
Biological and Agricultural	4,027
Architectural	3,320
Engr. Science and Engr. Physics	2,432
Petroleum	2,392
Engineering Management	1,859
Nuclear	1,440
Mining	602

* Total does not include Computer Science (outside engineering)

* Enrollment is for full time Bachelor's degree candidates in engineering.

E. Disciplinary Benchmarking

Below is a table of ACU competitors that indicates if they offer Mechanical Engineering.

Table 8: ACU Competitors

University	Mechanical Engineering Offered	University	Mechanical Engineering Offered
Texas A&M		UT-Rio Grande Valley	
Texas Tech		HSU	
Baylor		Grand Canyon	
Texas State		Harding	
UNT		OCU	
TCU	Mech. Emphasis	Pepperdine	3/2 program
Tarleton		Liberty	
UT-Austin		OU	
UTSA		Lipscomb	
UT-Arlington		Cal Baptist	

4. Curriculum

The Mechanical Engineering curriculum has been designed to match as many courses as possible with the proposed Electrical and Civil Engineering curricula. The shared courses are listed in the Engineering Core section below. The courses in the Mechanical Engineering core are chosen to prepare students for the Fundamentals of Engineering exam for Mechanical Engineers (<https://ncees.org/wp-content/uploads/2022/09/FE-Mechanical-CBT-specs.pdf>). The FE is not always required for practice as a Mechanical Engineer. However, there are some occupations where the FE is required, and others where it may be valuable to prospective employers.

A. Degree Plan

Engineering Core

- ENGR 115: Intro to ENGR – 1 credit hour
- ENGR 116: Intro to ENGR Lab – 1 credit hour
- ENGR 217: Career Skills – 1 credit hour
- ENGR 306: Engineering Ethics – 1 credit hours
- ENGR 317: Project Management – 1 credit hour
- ENGR 350: Engineering Economics – 3 credit hours *
- ENGR 390: Junior Clinic – 3 credit hours
- ENGR 430: Senior Clinic I – 2 credit hours
- ENGR 432: Senior Clinic II – 2 credit hours

Total: 12 Hours

Math/Science Requirements

- MATH 185: Calculus I – 3 credit hours *
- MATH 186: Calculus II – 3 credit hours
- MATH 286: Calculus III – 3 credit hours
- MATH 361: ODE – 4 credit hours
- PHYS 220: EP I – 3 credit hours *
- PHYS 221: EP I Lab – 1 credit hour
- PHYS 222: EP II – 3 credit hours *
- PHYS 223: EP II Lab – 1 credit hour
- ENGR 377: Engineering Statistics – 3 credit hours
- Students must choose 3 hours from the following Science Electives:
 - CHEM 133: General Chemistry I – 3 credit hours
 - BIOL 112: General Biology – 3 credit hours
 - GEOL 111: Introduction to Geology – 3 credit hours
 - BIOL 291: Anatomy and Physiology I - 3 credit hours
 - PHYS 330: Modern Physics - 3 credit hours

- Students must choose 3 hours from the following Math Electives:
 - PHYS 351: Applied Numerical Methods – 3 credit hours
 - MATH 325: Linear Algebra – 3 credit hours
 - MATH 463: Partial Differential Equations – 3 credit hours

Total: 21 Hours

Mechanical Engineering Core

- ENGR 117: Comp. Tools – 1 credit hour
- OR
- CS 120: Programming I - 3 credit hours
- ENGR 131: CAD – 1 credit hour
- ENGR 220: Statics – 3 credit hours
- ENGR 222: Dynamics – 3 credit hours
- ENGR 281: Thermodynamics – 3 credit hours
- ENGR 331: Fluid Mechanics Lab – 1 credit hour
- ENGR 332: Mechanics of Materials – 3 credit hours
- ENGR 333: Fluid Mechanics – 3 credit hours
- ENGR 338: Design of Machine Elements – 3 credit hours
- ENGR 135: Intro to Circuits – 3 credit hours
- ENGR 320: Material Science – 3 credit hours
- ENGR 334: Heat and Mass Transfer – 3 credit hours

Total: 30-32 Hours

Upper-level ENGR

Each student must complete 12 additional hours of upper-level ENGR, MECH, or PHYS courses not taken above.

Choose 6 hours from the following:

- ENGR 322: Advanced Dynamics – 3 credit hours
- ENGR 435: Finite Element Analysis – 3 credit hours
- ENGR 436: Systems and Controls – 3 credit hours

Choose 6 hours from the following:

- ENGR 300-499
- MECH 300-499
- PHYS 300-499

Total: 12 credit hours

Electives: 0 credit hours

Total: 74-76 credit hours

B. Courses

There are two tables below. The first indicates the core courses which will be required of students in any of the Engineering programs. The second contains the courses required of Mechanical Engineering students, as well as the Mechanical Engineering electives.

Proposed Engineering Core Curriculum

Engineering Core, required for all BSE majors	Credit Hours	Offerings
ENGR 115: Introduction to Engineering and Physics	1	Fall
ENGR 116: Introduction to Engineering and Physics Lab	1	Fall
ENGR 131: Computer Based Design	1	Each Semester
ENGR 217: Career Skills	1	Fall
ENGR 306: Engineering Ethics	1	Fall
ENGR 317: Project Management	1	Fall
ENGR 350: Engineering Economics	3	Fall
ENGR 377: Engineering Statistics	3	Spring
ENGR 390: Jr. Clinic	3	Spring
ENGR 430: Sr. Clinic I	2	Fall
ENGR 432: Sr. Clinic II	2	Spring

Proposed Mechanical Engineering Core Curriculum and Electives

Mechanical Engineering Required Courses	Credit Hours	Offerings
ENGR 117: Computational Tools for Engineers	1	Spring
ENGR 135: Introduction to Electric Circuits	3	Each Semester
ENGR 220: Statics	3	Each Semester
ENGR 222: Dynamics	3	Spring
ENGR 281: Thermodynamics	3	Spring
ENGR 320: Material Science	3	Fall
ENGR 331: Fluid Mechanics Lab	1	Fall
ENGR 332: Mechanics of Materials	3	Spring
ENGR 333: Fluid Mechanics	3	Fall
ENGR 334: Heat and Mass Transfer	3	Fall
ENGR 322: Advanced Dynamics	3	Fall
ENGR 435: Finite Element Analysis	3	Fall
ENGR 436: Systems and Controls	3	Spring

5. Assessment Plan

A. Curriculum Map

G. ENGR Core

	115	116	217	281	306	317	350	377	390	430	432
SO 1 - Problem Solving	X	X	X	X		X	X	X	X	X	X
SO 2 - Application of Design Principles	X	X					X			X	X
SO 3 - Communication		X	X		X		X	X		X	X
SO 4 - Decision Making	X	X			X	X	X			X	X
SO 5 - Teamwork		X					X	X	X	X	X
SO 6 - Experimentation						X		X		X	X
SO 7 - Learning Strategies			X						X	X	X

H. ME Core

	117	131	135	220	222	320	331	332	333	334	338
SO 1 - Problem Solving	X	X	X	X	X	X		X	X	X	X
SO 2 - Application of Design Principles			X	X					X		X
SO 3 - Communication				X					X		
SO 4 - Decision Making											
SO 5 - Teamwork				X							
SO 6 - Experimentation	X						X				
SO 7 - Learning Strategies									X		

B. Outcome Measures

ABET Student Outcomes

SO 1 (Solve Problems) - an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

SO 2 (Design Application) - an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

SO 3 (Communication) - an ability to communicate effectively with a range of audiences

SO 4 (Ethics/Decision Making) - 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

SO 5 (Teamwork) - an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

SO 6 (Experimentation) - an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

SO 7 (Learning Strategies) - an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

C. Assessment Cycle

Current ENGR Assessment Plan

Fall 2023	1	ENGR 333 (Fluid Mechanics)
	4	ENGR 306 (Ethics)
Spring 2024	3	ENGR 432 (Senior Clinic)
	6	ENGR 432 (Senior Clinic)
	7	ENGR 390 (Junior Clinic)
Fall 2024	3	ENGR 221 (Engineering Mechanics: Statics/Dynamics)
	5	ENGR 116 (Introduction to Engineering and Physics Laboratory)
	7	ENGR 430 (Senior Clinic)
Spring 2025	1	ENGR 281 (Thermodynamics)
	6	ENGR 136 (Introduction to Electric Circuits Laboratory)
Fall 2025	2	ENGR 116 (Introduction to Engineering and Physics Laboratory)
	4	ENGR 115 (Introduction to Engineering and Physics)
Spring 2026	2	ENGR 430/432 (Senior Clinic)
	5	ENGR 390 (Junior Clinic)

New ME Assessment Plan

Fall 2023	1	ENGR 333 (Fluid Mechanics)
	4	ENGR 306 (Ethics)
Spring 2024	3	ENGR 432 (Senior Clinic)
	6	ENGR 432 (Senior Clinic)
	7	ENGR 390 (Junior Clinic)
Fall 2024	3	ENGR 217 Engineering Career Skills
	5	ENGR 116 (Introduction to Engineering and Physics Laboratory)
	7	ENGR 430 (Senior Clinic)
Spring 2025	1	ENGR 220 Statics
	6	ENGR 331 (Fluid Mechanics Lab)
Fall 2025	2	ENGR 116 (Introduction to Engineering and Physics Laboratory)
	4	ENGR 115 (Introduction to Engineering and Physics)
Spring 2026	2	ENGR 430/432 (Senior Clinic)
	5	ENGR 390 (Junior Clinic)

Changes to current assessments:

- ENGR 136 will no longer be part of the curriculum – Replace with ENGR 331 (Fluid Mechanics Lab)
- ENGR 221 will no longer be part of the curriculum – Replace with ENGR 217 Engineering Career Skills
- ENGR 281 will only be required for Mechanical Engineering– Replace with ENGR 220 Statics to match Civil Engineering

6. Institutional Support

A. Faculty Requirements and Availability

[The ENGR MASTER List](#) provides the proposed course load and faculty availability, for the Fall/Spring of even/odd years. Teaching load is significantly higher in the Fall due to the large number of sections of ENGR 115 and ENGR 116.

In Mechanical Engineering there is a need for two faculty (or one professor of practice that could teach 15 hours/semester).

I. Baseline Requirements for New Mechanical Degree

The following table details the changes required to offer the Mechanical Engineering degree, without any concentrations. The offered sections of ENGR 136 will be reduced to once a year because the number of students required to take the course is reduced. These changes are counteracted by the need for a stand-alone Dynamics course and the need to offer ENGR 338: Design of Machine Elements every year.

Modifications due to New Engineering Core and Required Mechanical Classes

Course Title	Change to Sections	Net Change/Year
ENGR 136: Intro. to Circuits Lab	1 fewer section, Fall	-3 hours
ENGR 220: Statics	1 additional section, each semester	+6 hours
ENGR 221: Statics + Dynamics	1 fewer section, each semester	-8 hours
ENGR 222: Dynamics	1 additional section, Spring	+3 hours
ENGR 306: ENGR Ethics	Change from Fall to Spring	N/A
ENGR 334: Heat and Mass Transfer	Change from Spring to Fall	N/A
ENGR 338: Design of Machine Elements	Every year, Spring	+1.5 hours
ENGR 350: ENGR Economics	Change from Fall to Spring	N/A

Total Change to Engineering Course Load: -0.5 hours/year

B. Impact on Existing Programs

Enrollment in General Engineering will decrease drastically as more specific programs become available.

C. Program Director

Possibilities:

- Robert Brown
- Scott Marshall

D. Staff Requirements

Currently, the engineering faculty with mechanical engineering credentials are Scott Marshall and Robert Brown, who are both tenure-track faculty. Given projected growth within the first few years of offering this discipline-specific program, at least 4 total faculty members with mechanical engineering credentials will be needed, ideally with at least two tenure-track faculty.

As enrollment increases, the department will likely need to hire additional staff. An additional lab manager and additional administrative assistance may both be necessary.

E. Library Resources

Library resource requirements are typically limited for students in Engineering programs. It is unlikely that additional resources will be required.

The ACU Library offers a wide range of resources tailored to engineering disciplines. These include comprehensive databases of engineering journals and research papers, e-books and reference books. Our electronic resources are accessible 24/7, allowing students and faculty to conduct research and access materials anytime, anywhere.

INSPEC - The leading bibliographic database to scientific and technical papers in physics, electrical engineering, electronics, communications, control engineering, computing, information technology, manufacturing, production and mechanical engineering. The INSPEC database covers 1969–present and the INSPEC archives covers 1898–1968.

Science & Technology Collection - Contains over 800 leading full text journals covering topics including aeronautics, astrophysics, chemistry, computer technology, geology, aviation, physics, archaeology, and materials science.

IEEE Xplore Digital Library - The IEEE Xplore Digital Library is the premier database for research in electrical engineering, electronics, computer science and related disciplines. IEEE Xplore includes full-text access to over 180 IEEE peer-reviewed journals and magazines; 1,500 annual

conferences; active, archived and redline IEEE standards; as well as IET journals, magazines, and conferences.

Scifinder Scholar Search - SciFinder is a research discovery tool that allows you to explore the CAS databases that contain literature from many scientific disciplines, including biomedical sciences, chemistry, engineering, materials science, agricultural science, and more! Contains: CAS REGISTRYSM database, more than 16 million single- and multi-step reactions, more than 1 billion predicted property values, and more than 2 million experimental properties.

Proquest SciTech Premium Collection - The SciTech Premium Collection includes the Natural Science Collection and the Technology Collection and provides full-text titles from around the world, including scholarly journals, trade and industry journals, magazines, technical reports, conference proceedings, government publications, and more.

ScienceDirect - ScienceDirect is a leading full-text scientific database offering journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books. There are currently more than 11 million articles/chapters, a content base that is growing at a rate of almost 0.5 million additions per year.

Wiley Online Library - Multidisciplinary collection of online resources covering life, health and physical sciences, social science, and the humanities. It delivers seamless integrated access to over 4 million articles from 1500 journals, over 10,000 online books, and hundreds of reference works, laboratory protocols and databases.

Scopus - large abstract and citation database with more than 75 million records of journal articles, books, and conference papers. Scopus is unique in its features of discovery and analysis of shared authors, keywords, references, and citations.

Subject Librarians are available to assist with research inquiries, citation guidance, and utilizing information research tools.

F. Physical Resources

With current enrollment, no new space or physical resource needs. If enrollment expands, we will need more classroom space, and possibly additional lab equipment and/or lab space.

G. Scholarships

Scholarships are available through ASME, along with Engineering specific scholarships at ACU.

H. Recruiting

Continuation of a student success manager specific to engineering will help this program grow.

I. Additional Cost to Deliver

The additional faculty load will be the most significant cost, requiring two more faculty at a minimum. Course development is a one-time expense. Some cost will be shared with other ENGR programs.

7. Additional Information for Substantive Changes

A. Student Support Services

Add info here

B. Financial Resources

Add info here

C. Contingency Plans

Add info here

8. Supporting Documentation

A. Approval Chart for Curriculum Changes

Add info here

B. Memos of Support

Add info here

C. Memos from Individuals

Add info here

memo

To: Tim Head and Charla Miertschin
From: Jessica Smith
Date: September 14, 2023
Re: New Program Applications — Civil Engineering, Electrical Engineering, Mechanical Engineering

I commend the engineering faculty the work to propose thorough field-specific engineering program proposals. The curriculum is clear and makes good use of existing courses, and the program development process showed vision for the addition of additional discipline-specific courses as growing enrollment and additional faculty allow.

The curriculum is clearly linked to the proposed program outcomes, and the department has used its existing assessment plan as the foundation with some updates based on where measures will occur since some courses will be changing. However, the program outcomes and assessment plans of each program will need some revision before final approval of the proposal.

The proposed program outcomes are identical for the three programs. ACU requires at least one unique outcome per program. Thanks for beginning the discussion with me about whether it will make the most sense to update one outcome to focus on the specific area of practice or whether keeping the seven existing outcomes as presented and adding an eighth outcome unique to each program is the best fit for the programs. Resolving this allows us to clearly define each program and meet the expectations of the institution's accreditor, SACSCOC, and the disciplinary accreditor, ABET, where you plan to continue the department's accreditation.

Additionally, the university's best practice is for every program to measure every outcome every year. The minimum requirement for programs with six or more outcomes is to establish a two-year cycle where half of the measures are collected in odd years and half in even years. The proposed assessment plans use a three-year cycle that needs to be shortened. Additionally, the assessment plan will need to be updated to include unique measures for the discipline-specific outcome established for each program. The courses in the Civil Engineering Core, Electrical Engineering Core, and Mechanical Engineering Core sections are the best options for conducting course-embedded measures of the new/revised outcome because they are required for all students in that program.

We can resolve these focused questions while the programs continue to advance through campus faculty consideration. I will be glad to work with you as you consider options to address these issues, and I ask that you provide these updates to the applications by the first week of October. Assuming a positive vote from curriculum councils and campus faculty, the proposals will be ready to advance for the signatures of the Senior Vice President for Academic Affairs and the President when you resolve the questions outlined here in the proposals.

SACSCOC Notification of New Programs

Chris Riley <chris.riley@acu.edu>

Mon, Aug 28, 2023 at 12:58 PM

To: Darby Hewitt <darby.hewitt@acu.edu>

Cc: Tim Head <tim.head@acu.edu>, Tim Kennedy <timothy.kennedy@acu.edu>, Robert Brown <rlb16c@acu.edu>, Susan Lewis <lewiss@acu.edu>

OK. Based on the 25-49% notification threshold for new content, it looks like we will only need to notify SACSCOC related to the Civil (30%) and Mechanical (31%) and not Electrical (20%).

Thanks!

Chris Riley, J.D., M.P.A.

Assistant Professor, Department of Political Science and Criminal Justice

University [Pre-Law](#) Advisor

Title IX Co-Coordinator and SACSCOC Liaison

Abilene Christian University | ACU Box 29004 | Abilene, Texas 79699

p. 325-674-2000 | f. 325-674-4831

[Student Hours](#)

On Tue, Aug 22, 2023 at 3:57 PM Darby Hewitt <darby.hewitt@acu.edu> wrote:

Hi Chris,

Thanks for the email. That's great news! Your assumption is correct for most of the new courses, but some of the lab/lecture courses in EE have different numbers of hours (when not 3+1, it's usually 2+1) to accommodate 128 total hours in the degree plan. Here are the electronic versions of the reports for reference. All the new courses and their hour counts can be found in these.

Thank you so much for your work on this.

Sincerely,

Darby Hewitt, Ph.D.

Associate Professor of Engineering and Physics

Interim Executive Director of Engineering

Abilene Christian University

On Tue, Aug 22, 2023 at 1:45 PM Chris Riley <chris.riley@acu.edu> wrote:

Good afternoon!

Susan asked me to review the draft proposal for the three new engineering degrees regarding the timing of the notification/approval by SACSCOC.

Based on my review of the new courses required for these programs (i.e., new content), it's likely that only notification will be required. In that regard, I assumed one credit hour for the new lab courses and three credit hours for each non-lab course. Is that right?

The notification itself will need to occur following the approval of the new programs per ACU's curriculum process (and before the programs are implemented). I have all the information I need to notify SACSCOC except the implementation date. Once I receive that date and the confirmation that the programs have received internal approval, I will provide drafts of the notification for you to review prior to sending it to SACSCOC.

Please let me know if you have any questions!

Chris Riley, J.D., M.P.A.

Assistant Professor, Department of Political Science and Criminal Justice
University [Pre-Law](#) Advisor

Title IX Co-Coordinator and SACSCOC Liaison

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[Student Hours](#)

September 12, 2023

Dear Drs. Hewitt, Brown, and Kennedy,

Thank you sharing the assessment plans for Mechanical Engineering, Civil Engineering and Electrical Engineering degrees. Based on the Adams Center review of the assessment plans and conversations with each of you regarding assessment, we approve each of the three plans.

This letter is not meant to be a final approval in the degree application process. Instead, it is intended as a reference which will be read by your department chair and members of the council, who may also have questions or comments of their own.

We would like to thank you for allowing the Adams Center team to review the assessment plans. The instructional design team would love to work with you on your syllabus, as well as the design, development or revision of this and other courses. If there is anything else we can do to help you, please feel free to let me know.

On behalf of the Adams Center,

Dr. Laura Carroll
Assistant Provost for Teaching, Learning and Vocational Formation

.

ABILENE CHRISTIAN UNIVERSITY

LIBRARY

M E M O R A N D U M

DATE: September 15, 2023
TO: Dr. Darby Hewitt
FROM: Mark McCallon, Associate Dean for Library Services
RE: New Program Proposal – Bachelor of Science in Mechanical Engineering

After reviewing the program application, the ACU Library can support the proposed program if it can maintain funding for subscription resources that the Library currently provides. See the information about current library resources in the program application. Thank you for letting us review the program application.



To: Darby Hewitt, Executive Director of Engineering

From: John Ehrke, Chair of Mathematics

Re: Memo of Support for New Engineering Programs

I have reviewed the proposals for new degrees in Mechanical, Civil and Electrical Engineering as put forth in program application. The mathematics department, as a member of the College of Science and Engineering is fully in support of these new programs as they show great promise to further college goals related to recruiting, retention, and academic excellence. As a matter of institutional support, however, it should be noted that the mathematics department is not currently able to adequately support the growth in enrollment predicted by these proposals.

Per the proposals, Mechanical engineering projects 75-100 students each year. Civil Engineering projects 18-50 students each year. And Electrical engineering projects 35-50 students total each year. This is 128-200 total students per year. Compared to present enrollment numbers this reflects a roughly 100% increase in engineering-related enrollments in our courses. Engineering students as a percentage in total enrollment for math courses which currently serve the major vary from ~50% in lower-level courses to as high as 80%+ in upper-level courses. Based on this expectation I will lay out the expected impact on mathematics course offerings.

The following mathematics courses exist in support of these degrees. I have included most recent Fall and Spring enrollments in these courses along with the predicted enrollment increases and changes to course hour offerings based on this proposal. Max enrollment represents the largest physical classroom space currently available to the



department. It should be noted that class sizes above 24-30 are not pedagogically sound for instruction above the 100 level, but we have maintained enrollments above that threshold for quite some time now in classes that serve engineering students. Numbers in parentheses indicated multiplier used for class increase projections. I'm also including a +3 credit hour increase per semester to capture maximum load

requirements for semesters where 1 or more classes unexpectedly need extra sections due to clustering. Courses like MATH 109 and MATH 227 will see enrollment increases as well, but the impact should be manageable.

Spring 2023

Course	Enroll	Sections	Max Enroll	Projected Enrollment	Credit Hour Increase
MATH 124 – Pre-Calculus II	26	1	32	39 (1.5)	+1.5
MATH 185 – Calculus I	30	2	32	48 (1.6)	+3
MATH 186 – Calculus II	35	1	42	56 (1.6)	+3
MATH 286 – Calculus III	19	1	42	30 (1.6)	+0
MATH 325 – Linear Algebra	29	1	42	46 (1.6)	+3
MATH 361 – Ordinary Differential Eqns	24	1	32 (lab)	43 (1.8)	+4
MATH 463 – Partial Differential Equations	13	1	25	17 (1.3)	+0
				Subtotal	+14.5
				Total (+3)	+17.5



Fall 2023

Course	Enroll	Sections	Max Enroll	Projected Enrollment	Credit Hour Increase
MATH 124 – Pre-Calculus II	51	2	32	77 (1.5)	+0
MATH 185 – Calculus I	45	2	32	72 (1.6)	+3
MATH 186 – Calculus II	22	1	42	35 (1.6)	+1.5
MATH 286 – Calculus III	20	1	42	32 (1.6)	+0
MATH 361 – Ordinary Differential Eqns	32	1	32 (lab)	58 (1.8)	+4
				Subtotal	+8.5
				Total (+3)	+11.5

Based on the above, the projected level of institutional support for the mathematics department is:

- An immediate increase of 1 FTE – preferred Ph.D. tenure-track for flexibility in teaching upper-level classes. (Note: This is in addition to the current need for a faculty member in statistics/actuarial science, for which we are currently hiring.)
- Adjunct help is unlikely to assist this issue as we already use 4-6 adjuncts regularly per semester.
- There may be an additional need for 1 FTE in the next 5 years depending on enrollments since the projections above (calling for 1 FTE) still have average class sizes well in excess of 30 students.
- The spring semester will be the hardest to cover for the department.



So, while the department is excited about the possibility of new students added by these programs, we are not in a position to support the projected growth. If we are not able to add a faculty hire this year in statistics, we will be completely unable to meet the demand beginning in 2024 and will need to close sections.

The department looks forward to working with Engineering and Physics, the College of Science and Engineering, and the University as we move forward on this plan.

Blessings,

John Ehrke

Dr. John Ehrke
Chair of Mathematics

SCHOOL OF INFORMATION TECHNOLOGY AND COMPUTING

M E M O R A N D U M

DATE: September 12, 2023
FROM: John Homer, Director for SITC
RE: Department approval for proposed Engineering programs

The School of Information Technology and Computing supports the proposed creation of new programs for Electrical Engineering, Civil Engineering and Mechanical Engineering. We believe these distinct programs will prove to be beneficial to current and prospective students. We note that CS 120, an SITC course, is included in a menu in each program and attest that seats will be available in this course for students in these programs.

John Homer

Memo of support for new program proposals

Jennifer Huddleston <jrh11a@acu.edu>
To: Darby Hewitt <darby.hewitt@acu.edu>

Mon, Sep 11, 2023 at 6:18 PM

Darby,

I support the inclusion of the BIOL classes listed in your proposals for both Mechanical Engineering and Civil Engineering.

Dr. Jennifer R. Huddleston

Associate Professor
Department Chair
Department of Biology
Abilene Christian University
202 Halbert-Walling Research Center
ACU Box 27868
Abilene, Texas 79699-7868
office: 325-674-2010
fax: 325-674-2009

jennifer.huddleston@acu.edu

Book an appointment

[Quoted text hidden]

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September 10, 2023

The department of Chemistry and Biochemistry supports the proposals for the B.S. degrees in Mechanical Engineering, Electrical Engineering, and Civil Engineering. The department can accommodate the students in the required and selection General Chemistry Courses.

A handwritten signature in black ink, appearing to read 'Autumn Sutherlin'.

Autumn Sutherlin, Ph.D.
Chair and Professor
Department of Chemistry and Biochemistry
Abilene Christian University