

Approval Chart for Curriculum Changes

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

Course Number ENGR 435 or Degree Plan(s) _____
 State the requested change and reason. A memo may be attached if more space is necessary.

See Attached

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

Change to a Course		Dept./School	College Academic	Deans	COUNCIL ¹				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	I	A		I			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.

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

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

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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)	
 <i>Signature</i>	<i>10/30/18</i> <i>Approval date</i>
<i>Signature</i>	<i>Approval date</i>

College Academic Council(s)	
 <i>Signature</i>	<i>12-7-2018</i> <i>Approval date</i>
<i>Signature</i>	<i>Approval date</i>

Dean(s)	
 <i>Signature</i>	<i>12/12/18</i> <i>Approval date</i>
<i>Signature</i>	<i>Approval date</i>

Teacher Education Council	
<i>Chair's signature</i>	<i>Approval date</i>

General Education Council	
<i>Chair's signature</i>	<i>Approval date</i>

Undergraduate Academic Council	
<i>Chair's signature</i>	<i>Approval date</i>

Graduate Council	
<i>Chair's signature</i>	<i>Approval date</i>

Provost	
<i>Signature</i>	<i>Approval date</i>

Faculty	
<i>Chair of faculty senate</i>	<i>Approval date</i>

President	
<i>Signature</i>	<i>Approval date</i>

Application for a New Course v10.6

Course ID <i>Subject and Number</i>	ENGR 435
Date APPROVED	
Date DENIED	

I. Systems and Catalog Information Complete each item.

1	Course Developer	Robert Brown
2	Course Teacher	Robert Brown
3	Course Title	Finite Element Analysis
4	Course Abbreviation (if title is over 30 characters)	
5	College	College of Arts and Sciences
6	Department	Department of Engineering and Physics
7	Number of Credit Hours	3
8a.	Number of contact hours - lecture	2
8b.	Number of contact hours – lab/activity	2
9	Is the course for a fixed or variable number of credit hours?	Fixed
10	Explanation for variable credit	
11	Is the course repeatable for additional credit?	No
12	Maximum total number of credit hours a student can earn for this course	3
13	What type of course is this? (Select one. Please see Schedule Type definitions above.)	☐ Traditional lecture ☐ Traditional lab ☒ Traditional lecture/lab ☐ Experiential Learning ☐ Seminar ☐ Studio ☐ Thesis ☐ Dissertation

14	Instructor Workload	4 Hours
15	Grade Mode (check all appropriate):	☒ X Standard ☐ Credit/No Credit (undergrad only)
16	Maximum Enrollment	18
17	Catalog Description (50 words or less)	Introduction to basic theory and usage of the Finite Element Method (FEM) applied to solid mechanics. Formulation of 1-D and 2-D FEM and use of computer software for 2-D and 3-D analysis. Design and optimization of solid objects.
18	List any prerequisites (course/s, test scores, class standing, major, etc.)	MATH 286, MATH 361, ENGR 221
19	List any co-requisites	
20	If the course is cross listed, specify the Course ID(s); MUST have signature in Section V from all Department Chairs	
21	Does this course have any special student costs?	☐ No ☒ Yes (<u>Student Lab Fee per CAS policy</u>) (If yes, must attach a <u>completed</u> "Request to Add or Change Course Fees" form. Describe in section IV-F.)
22a	How frequently will the course be offered in the Fall ? All, even or odd years?	Even years
22b	How frequently will the course be offered in the Spring ? All, even or odd years?	
22c	How frequently will the course be offered in the Summer ? All, even or odd years?	
23	First semester this course will be offered <i>New courses may not be taught under their approved course ID until they appear in the catalog, therefore, no earlier than the coming fall.</i>	Fall 2020
24	List course/s that should be deleted, (Also, include the last semester for course/s being deleted)	

	<i>a requirement in a degree plan in any department.</i>	
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25	Is this course required for a degree/s? <i>If "Yes," attach a revised degree plan(s) reflecting the placement of the new course.</i>	☒ No ☐ Yes
26	Should the addition of this course be retroactively applied to the degree plan it supports?	☒ No ☐ Yes Explanation:
27	Has this course been offered as a Special Topics course?	☒ No ☐ Yes <i>If "Yes," specify the Course ID and enrollment for each term it was taught. (Note: New courses are NOT required to be taught as Special Topics courses prior to being approved. However, a course may be taught once as Special Topics before it is proposed. See the Course Descriptions section of the Catalog for details.)</i>
28	List any courses in which the content overlaps the proposed course. (Course ID and Name) <i>Attach a statement from the instructor/dept chair of the existing course justifying the new offering in Section IV-D.</i>	

II. Curriculum

1	Degree Plan Explanation of how this course affects degree requirements.	The course will be required as a depth elective for students pursuing the ME Track within the Bachelor of Science in Engineering degree.
2	Justification State the justification for adding this course to the current curriculum. Represent the need.	Based upon recent (Fall '17 and Spring '18) feedback from the ACU Engineering Industrial Advisory Board, ACU admissions, recent ('17 and '18) senior exit surveys, and the American Society of Engineering Educators, additional depth in engineering disciplines is needed within our degree plan to increase competitiveness of ACU graduates in the job market. Finite Element Analysis is a crucial part of design for new pieces and specific objects. By understanding the basics and gaining experience with standard

		software, students will be more prepared for certain aspects of Mechanical Engineering.
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III. Course Design

1. Audience and Course Goal

1	Describe the intended audience, including prerequisite skills.	This course is intended for all students interested in depth studies in Mechanical Engineering within the BSE. It is intended primarily for Juniors in the program. This builds on mathematical concepts taught in MATH 286 and MATH 361. Additionally, students should have taken Mechanics of Materials, ENGR 332.
2	State the overarching course goal(s) in performance terms.	Students should be able to build their own solver to solve simple truss and frame problems. They should understand the process by which finite elements are created and applied to a problem, and how that problem is then solved. They should be able to compute and assemble stiffness matrices for simple problems by hand. Finally, they should be able to use existing FEA solvers such as ANSYS for analysis and design.

2. Competencies and Measurements

	Competency	Measurement
1	To understand the equations governing the finite element method	Homework, quizzes, and exams
2	To understand common shape functions and finite element types .	Homework, quizzes, and exams
3	To understand the process of discretization and assembling local elements into one global problem	Homework, quizzes, exams, and programming project
4	To understand the discretization of complicated problems through mesh generation	ANSYS projects
5	To understand sources of error in finite element analysis	Homework, quizzes, and ANSYS projects
6	To understand the use of FEA in design and optimization	ANSYS projects
7		

8		
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3. Text and Resources

Required Text: A First Course in the Finite Element Method by Daryl L. Logan.

IV. Supporting Documentation

Supporting documents must accompany proposal prior to preliminary approval by chair and dean.

1	Library — Submit new course application and syllabus to the Dean of the Library. Consult with the director and establish a deadline for completion of the library report. Attach the signed copy of the Library report.
2	Instructional Design — The application and syllabus must be reviewed by the Adams Center. Attach a copy of the Adams Center Review Letter.
3	Content Overlap — Include one document for each course you listed in Section I-I. Attach statement from instructor/dept chair of existing course justifying the new offering.
4	Departmental Resources — List the resources that support the course and are available only through the department, if applicable. Attach the list of the holdings and the location/s.
5	Resources — List resources (other than library or departmental resources) that are needed to support this course (computers, lab equipment, other technology, etc.). Attach a complete list of all items and indicate possible sources or estimated cost of each. List the sources of any needed funds.
6	Expenses — List additional expenses needed to implement this course (full-time or part-time faculty, graduate or lab assistants, student employees, travel, special student costs, room renovation, storage facility, etc.). Attach a complete list of all items, the estimated cost of each and the source of the funds.
7	Justification — Attach all documents referred to in Section II-2
8	Syllabus — Attach the syllabus for the course based upon the anticipated first-semester offering.
9	Provide documentation for all additional attachments here

V. Preliminary Approvals

All supporting documentation has been assembled and attached to this application. I believe this course is ready to be presented to appropriate councils. We have a plan to fund this new course.

Course Number and Name ENGR 435

Primary Department

[Signature]
Department Chair

Dean of the College

10/30/18
Date

Date

Cross-listing Department *Add more lines if multiple departments are cross-listing*

Department Chair

Dean of the College

Date

Date

Cross-listing Department *Add more lines if multiple departments are cross-listing*

Department Chair

Dean of the College

Date

Date

VI. Actions *Place all actions on one page.*

Course ID: _____

Course Title: _____

1. College Academic Council: (for all courses)

Note: Insert additional lines for College Academic Council action for each college involved in cross-listed courses.

Approved _____ Denied _____
College Dean or Director Date

Approved _____ Denied _____
College Dean or Director Date

2. Graduate Council: (for graduate level courses)

Approved _____ Denied _____
Dean of Graduate School Date

3. Teacher Education Council: (when applicable)

Approved _____ Denied _____
TEC Chair Date

4. University General Education Council: (when applicable)

Approved _____ Denied _____
Provost's designee Date

5. University Undergraduate Academic Council: (*undergraduate level courses*)

Approved _____ Denied _____
Vice Provost Date

6. Academic Provost: (for all courses)

Approved _____ Denied _____
Provost Date

7. President of the University: (for all courses)

Approved _____ Denied _____
President Date

Attach notes, comments, or conditions from appropriate councils:

ABILENE CHRISTIAN UNIVERSITY

LIBRARY

M E M O R A N D U M

DATE: 21:57
TO: Robert Brown
FROM: Mark McCallon, Associate Dean for Library Services
RE: New Course Proposal, ENGR 435 – Finite Element Analysis

The library has examined the course application and syllabus and is able to support the proposed course. Please contact Erica Pye (exp10a@acu.edu) , Librarian Liaison to the Department of Engineering and Physics, if additional library resources are needed for the course. Thank you for letting us review the course proposal.

Dr. Robert Brown
robert.b@acu.edu
OSC 123C

Re: Review of ENGR 435: Finite Element Analysis

Dear Dr. Brown,

Thank you for the submission of ENGR 435: Finite Element Analysis. I reviewed the syllabus based on the ACU Syllabus Guidelines. Please check the attached list, which indicates whether items have been addressed.

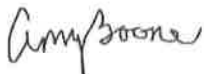
In addition, I also reviewed the syllabus from an instructional design perspective and here are changes that I suggest you make:

- Be sure to include the course calendar in the syllabus prior to distributing to students
- Title IX is a recommended syllabus piece
- It appears you're utilizing specifications grading for this course. Consider clarifying in the Grading section if students working toward an A or B are also required to complete exams and ANSYS lab homework. Also consider clarifying if students seeking a C or D have any programming projects to complete.

This letter is not meant to be a final approval in the course 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 appreciate it if you could modify the syllabus items based on our suggestions, or prepare to justify keeping the items as they are.

We would like to thank you for allowing the Adams Center team to review your course application. 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.

Sincerely yours,



Finite Element Analysis (ENGR 435)

Fall 2020 - M 2:00-4:50 - OSC B45 - 1 Credit Hour

Instructor: Assistant Professor Robert Brown

Email: robert.b@acu.edu

Office: OSC 123C

Phone: (918) 260-9772 (cell)

Office Hours: MW 9:00-11:00 AM, TR 3:00-4:30 PM (or by appointment)

Text: Online notes prepared through Canvas.

Course Catalog Description: Introduction to basic theory and usage of the Finite Element Method applied to solid mechanics. Formulation of 1-D and 2-D FEM and use of computer software for 2-D and 3-D analysis. Design and optimization of solid objects.

Prerequisite: MATH 286, MATH 361, ENGR 221.

Intended Audience: This course is required for all students pursuing the Mechanical Engineering track of the BSE. It is intended primarily for Juniors in the program.

Class Structure:

The course will consist of both lecture and lab components. In lecture, the primary focus will be the derivation of theory and implementation on small-scale problems (less than 10 elements). In lab, we will spend time developing FEA programs for simple problems and using existing solvers (such as ANSYS) for more complex problems.

Homework and exams will be used to gauge understanding of FEA concepts, while projects and lab work will be used to gauge understanding of the use of FEA in practice.

Grading:

A - All "C" work and completion of both programming projects.

B - All "C" work and completion of one of two programming projects.

C - 70% or higher on all exams, completion of all ANSYS lab homework

D - At least 50% on all exams, but failure to complete all "C" work

F - Failure to complete all "D" work

Classroom Policies:

Students are expected to be in class on time and participate by taking notes, asking questions, and working through labs during class time. Attendance is required to receive credit for labs, and tardiness will be counted as an absence if a student is more than 10 minutes late.

Learning Objectives Addressed in this Course:

Students should develop an ability to apply uncertainty analysis to measurements. This is assessed through lab reports and practicums/exams.

Students should develop an ability to understand the fluid principles behind measurement devices. This is assessed through lab reports and practicums/exams.

Students should develop an ability to perform and analyze basic computational fluid dynamics simulations. This is assessed through CFD lab reports.

Students should develop an ability to write effective technical documents. This is assessed through lab reports.

Academic Integrity

Students or groups of students are expected to submit work that is their own.

Academic integrity is defined as academic work completed as assigned for each class by the individual or group responsible for the work. Violations of academic integrity and other forms of cheating involve the intention to deceive, mislead, or misrepresent and therefore, are a form of lying. Such actions are contrary to behavioral norms that flow from the nature of God. Academic misconduct includes, but is not limited to, the following: 1) Failing to give credit to sources used in a work in an attempt to present the work as one's own, 2) Submitting papers or projects obtained from another source (e.g., research service or club paper file) as one's own, 3) Falsifying information orally or in writing, and 4) Receiving, giving, or using unauthorized aid on an examination or quiz. Academic misconduct may result in, but is not limited to, a zero on the assignment and/or an F in the course. Additionally, the department chair, Dean of the College of Arts and Sciences, and the Dean of Student Life will be notified. See the full university policy, including how to appeal a decision, by following this link: <http://www.acu.edu/academics/provost/policies/index.html>.

University ADA Compliance Statement

Abilene Christian University is dedicated to removing barriers and opening access for students with disabilities in compliance with ADA and Section 504 of the Rehabilitation Act. The Alpha Scholars Program facilitates disability accommodations in cooperation with instructors. In order to receive accommodations, you must be registered with Alpha Scholars Program, and you must complete a specific request for each class in which you need accommodations. If you have a documented disability and wish to discuss academic accommodations, please call our office directly at 325-674-2667.

The mission of ACU: to educate students for Christian service and leadership throughout the world.

The mission of the College of Arts and Sciences: to educate students for worldwide Christian service and leadership through programs of study and other learning experiences that blend a liberal arts education with professional and career education.

The mission of the Engineering and Physics Department:

The ACU engineering program strongly supports the university's mission of educating students for Christian service and leadership throughout the world. In support of this mission, ACU engineering graduates will attain:

- A deep and broad understanding of engineering principles and practices as evidenced by professional employment, continued professional development and graduate study in engineering or other professional fields.
- An extensive knowledge of the innovative design processes unique to engineering professionals, as demonstrated by using critical thinking skills in contribution to scientific and technical literature, patents and intellectual property, professional societies, and creative designs.
- A thorough understanding of Christian service and leadership as shown in commitments to professionalism, ethics, and service and leadership within the engineering profession, church and society.

Christian Perspective

As a Christian engineer, I believe you can best glorify God by excelling in your chosen profession, and doing so morally and ethically. The foundation of this excellence is technical proficiency, without which moral and ethical concerns cannot be addressed. This course is intended to provide you with technical skills required for a moral and ethical engineer.

Title IX Compliance Statement

"As a Christian community, Abilene Christian University has committed itself, unequivocally, to ensuring a working and learning environment in which the dignity of every individual is respected. Harassment is defined as unwelcome behavior or conduct based on sex, religion, race, age, color, national origin, veteran's status, disability, or any other characteristic protected by law when (1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment, education, or participation in University programs or activities, (2) submission to, or rejection of, such conduct by an individual is used as the basis for a decision affecting an individual's employment, education, or participation in University programs or activities, or (3) such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive environment for work, education, or participation in a University program or activity. See the full university policy by following [this link](#).