Engineering and Physics

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Faculty
Jeff E. Arrington, *Associate Professor*
James Cutbirth, *Adjunct Professor*
Michael Daugherity, *Associate Professor*
Jess Dowdy, *Professor and Assistant Department Chair*
Tim Head, *Associate Professor*
J. Darby Hewitt, *Assistant Professor*
Donald Isenhower, *Professor*
Paul Edwin Morris, *Professor*
Kenneth Olree, *Associate Professor and Director of Engineering*
Michael Ervin Sadler, *Professor*
Matthew Steele, *Assistant Professor*
Rusty Towell, *Professor*
Joshua Willis, *Associate Professor*

Majors and Tracks:
Computational Physics (BS Physics)
Engineering Science Technology (BS Physics)
Engineering (BSE)
Engineering Physics (BS Physics)
Medical Physics (BS Physics)
Physics (BS Physics)

High School Teacher Certification
Composite Science – Engineering and Physics (BS)
Physics and Mathematics (BS)

Minors: Engineering Science
Physics

The Department of Engineering and Physics offers two different 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 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, page 54). A minor in engineering science or physics may be added to other majors.

Introduction
In the Abilene Christian University Department of Engineering and Physics, students share in an intellectual atmosphere that promotes the growth of individual abilities. The faculty and students in engineering and physics do not confine learning to the classroom, but rather join in a broad spectrum of activities that includes doing basic research, completing engineering internships, teaching in the laboratory, participating in national student organizations and working in the astronomical observatory.

Many of our graduates have gone into graduate programs with fellowships and assistantships at excellent universities in physics, engineering physics, medicine, medical physics, computer science, astronomy, and many fields of engineering throughout the country while others have gone directly into industry positions. Our graduates agree that their undergraduate training at ACU was particularly well suited for their endeavors.

Electronics and Instrumentation
The department is well equipped to offer electronics and instrumentation to science and engineering majors and others who need this training. The instrumentation laboratory contains modern equipment and features microprocessor technology with an emphasis on the interface between hardware and software.

Applied Physics M.S. Program at Texas Tech University
Under an articulation agreement, ACU students are guaranteed acceptance into Texas Tech University's MS degree program in physics after completing a BS degree at ACU in physics with the following stipulations:

1. Have a minimum cumulative GPA of 3.00 and GPA of 3.25 in advanced physics courses;
2. Receive at least a "B" in PHYS 432, 491, 472, and 342; and
3. Meet all of the requirements of the Texas Tech Graduate School.

Special Offerings for Non-Majors
Physics can help students explore the universe with a telescope, consider the stewardship of creation, think about the influence which science has had on the world, and think about the relationship between science and religion. The Department of Physics has courses for non-majors, which explore each of these areas. PHYS 101, Astronomy, uses telescopes to look at the universe. PHYS 378, History and Philosophy of Science, and PHYS 379, Religion and Science, both explore the relationship between science, religion, literature, social science and the arts. These courses will satisfy university general education requirements.

Study Abroad Expectations
All students are encouraged to participate in ACU's Study Abroad program. Classes offered at Study Abroad sites vary depending on the site. Academic advisors can assist students in planning ahead for their Study Abroad experience and should be consulted during the freshman year.

Bachelor of Science in Engineering Degree (BSE)

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 Precalculus II (MATH 124) when the student enters ACU, his or her graduation may be delayed.

Admission Requirements
Before being admitted to the Engineering program, students must satisfy the requirements listed in the *ACT/SAT Placement Information* section of this catalog (page 20) and place in MATH 124. Before being admitted to any degree in this department, a student must score a 28 on the math section of the ACT (or equivalent math SAT score) or satisfy the prerequisite for ENGR 115.

ENGINEERING (BSE)

BS: ENGINEERING DEGREE PLAN (ENGR)
UNIVERSITY REQUIREMENTS
Please see the University Requirements section of this catalog (page 39).
MAJOR REQUIREMENTS
Engineering Physics
PHYS 220 Engineering Physics I .....(3)[1]

PHYS 221 Engineering Physics I Laboratory	(1)[1]
PHYS 222 Engineering Physics II	(3)[1]
PHYS 223 Engineering Physics II Laboratory	(1)[1]
Engineering	
ENGR 115/116 Introduction to Engineering and Physics	4
ENGR 220 Engineering Mechanics: Statics	3
ENGR 222 Engineering Mechanics: Dynamics	3
ENGR 335/336 Introduction to Electronics Lecture/Lab and ENGR 342/343	6
Fluid Dynamics, Mechanics of Materials, ENGR 481	9
Choose 5 from ENGR 200-499	15
ENGR 430 Capstone/Design I	4
ENGR 432 Capstone/Design II	4
Physics	
PHYS 330/331 Modern Physics Lecture/Lab	4
Philosophy	
PHIL 379 Philosophy, Religion and Science	(3)[1]
Mathematics	
MATH 185 Calculus I	(3)[1]
MATH 186 Calculus II, 286 Calculus III, 361 Ordinary Differential Equations	9
Math/Science Selections	
College Level Math, Chemistry, Physics, or Biology	8
Economics	
ECON 261Principles of Microeconomics	(3)[1]
Design	
DSGN 232 Digital Design Communication	3
TOTAL	**72**

[1]Hours (in parenthesis) may also fulfill university requirements and are not included in total major hours

ELECTIVES	
Minimum	0
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.*

Bachelor of Science Degrees (BS)

General Departmental Requirements

Engineering and physics majors must develop mathematical skills as well as experimental, theoretical, and computational abilities. If the student does not qualify to take Precalculus II (MATH 124) when the student enters ACU, his or her graduation may be delayed.

Admission Requirements

Before being admitted to one of these programs, students must satisfy the requirements listed in the *ACT/SAT Placement Information* section of this catalog (page 20) and place into MATH 124. Before being admitted to any degree in this department, a student must score a 28 on the math section of the ACT (or equivalent math SAT score) or satisfy the prerequisite for ENGR 115.

PHYSICS (BS)

BS: PHYSICS DEGREE PLAN (PHYS)	
UNIVERSITY REQUIREMENTS	
Please see the University Requirements section of this catalog (page 39).	
MAJOR REQUIREMENTS	
Physics	
ENGR 115/116 Intro to Engineering and Physics	4
PHYS 220 Engineering Physics I	(3)[1]
PHYS 221 Engineering Physics I Lab	(1)[1]
PHYS 222 Engineering Physics II	(3)[1]
PHYS 223 Engineering Physics II Lab	(1)[1]
PHYS 330/331 Modern Physics Lecture/Lab	4
PHYS 362/363 Optics	4
PHYS 379 Philosophy, Religion and Science	(3)[1]
PHYS 497/498 Physics Capstone I, II (capstone and writing-intensive course)	4
Mathematics	
MATH 185 Calculus I	(3)[1]
MATH 186 Calculus II	3
TOTAL	**19**

[1]Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

CONCENTRATIONS (CHOOSE ONE)	
Physics Track (PHYS)	
PHYS 335/336 Intro to Electronics w/ Lab	3
PHYS 360 Electricity & Magnetism	3
PHYS 371 Classical Mechanics	3
PHYS 461 Nuclear Physics	3
PHYS 463 Math of Physics and Engineering	3
PHYS 472 Solid State Physics	3
PHYS 481 Thermodynamics	3
PHYS 491 Quantum Mechanics	3
PHYS 493 General Relativity	3
MATH 286 Calculus III	3
MATH 325 Linear Algebra	3
MATH 361 Ordinary Differential Equations	3
CHEM 131/133 General Chemistry I w/ Lab	4
CS 120 Programming I	3
TOTAL	**43**
Medical Physics (PHYM)	
BIOL 112/114 General Biology I w/ Lab	4
BIOL 113/115 General Biology II w/ Lab	4
CHEM 131/133 General Chemistry I w/ Lab	4
CHEM 132/134 General Chemistry II w/ Lab	4
CHEM 221/223 Organic Chemistry I w/ Lab	4
CHEM 322/324 Organic Chemistry II w/ Lab	4
CHEM 453/463 Biochemistry I w/ Lab	4
CS 120 Programming I	3
MATH 123 Elementary Statistics	3
MATH 286 Calculus III	3
MATH 361 Ordinary Differential Equations	3
PHYS 335/336 Intro to Electronics w/ Lab	3
PHYS 360 Electricity & Magnetism	3
PHYS 461 Nuclear Physics	3
PHYS 463 Math of Physics and Engineering	3
TOTAL	**52**
Engineering Science Technology (PHYA)	
CS 115 or above	3
ENGR 140 Engineering Computer Based Design	3
PHYS 335/336 Introduction to Electronics Lecture/Lab	3
Choose 3 additional hours of PHYS	3
TOTAL	**12**
Engineering Physics (PHYN)	
CS 120 Programming I	3
CS 130 Programming II: Data Structures	3
CHEM 131/133 General Chemistry I w/ Lab	4
ENGR 140 Engineering Computer Based Design	3
ENGR 220 Engineering Mechanics: Statistics	3
ENGR 222 Engineering Mechanics: Dynamics	3
MATH 286 Calculus III	3
MATH 341 Numerical Methods *or* MATH 377 Statistical Methods I	3

MATH 361 Ordinary Differential Equations 3
PHYS 335/336 Introduction to Electronics Lecture/Lab 3
PHYS 360 Electricity & Magnetism 3
PHYS 371 Classical Mechanics 3
PHYS 463 Math of Physics and Engineering 3
PHYS 481 Thermodynamics 3
PHYS 491 Quantum Mechanics 3
PHYS 342/343 Instrumentation Lecture/Lab *or*
PHYS 388 Network Analysis 3
TOTAL 49

Computational Physics (PHYC)
CS 130 Programming II and Data Structures 3
MATH 341 Numerical Methods 3
MATH 377 Statistical Methods I 3
PHYS 451 Simulation and Modeling 3
PHYS 453 Pattern Recognition 3
Choose 3 additional hours from CS 300-499 *or*
PHYS 300-499 (except 378) 3
Choose 3 additional hours from PHYS 300-499 (except 378) 3
TOTAL 21

ELECTIVES

Physics Track (PHYS) 10
Medical Physics (PHYM) 1
Engineering Science Technology (PHYA) 41
Engineering Physics (PHYN) 4
Computational Physics (PHYC) 32

TOTAL MAJOR HOURS 72

OTHER GRADUATION REQUIREMENTS

Minimum grade for PHYS courses 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.*

HIGH SCHOOL TEACHER CERTIFICATION PHYSICS AND MATHEMATICS (BS)

BS: HIGH SCHOOL TEACHER CERTIFICATION - PHYSICS AND MATHEMATICS DEGREE PLAN (PHMT)

UNIVERSITY REQUIREMENTS

Please see the University Requirements section of this catalog (page 39).

MAJOR REQUIREMENTS

Physics
PHYS 220 Engineering Physics I ..... (3)[1]
PHYS 221 Engineering Physics I Lab ..... (1)[1]
PHYS 222 Engineering Physics II ..... (3)[1]
PHYS 223 Engineering Physics II Lab ..... (1)[1]
PHYS 330/331 Modern Physics Lecture/Lab 4
PHYS 335/336 Introduction to Electronics 4
PHYS 401 Secondary Science Methods 3
PHYS 497/498 Physics Capstone I/II (capstone and writing-intensive course) 4
TOTAL 15

Mathematics
MATH 185 Calculus I ..... (3)[1]
MATH 186 Calculus II 3
TOTAL 3

CONCENTRATIONS (CHOOSE ONE)

Physics and Mathematics (PHMT)

Choose 5 addition hours (3 must be advanced from PHYS 300-499 (except 378) 5

Math
MATH 187 Calculus Computer Lab 1
MATH 227 Discrete Mathematics 3
MATH 286 Calculus III 3
MATH 309 Algebraic Concepts for Teachers I 3
MATH 311 Geometric Concepts for Teachers I 3
MATH 361 Ordinary Differential Equations 3
MATH 377 Statistical Methods I 3
PHMT TOTAL 24

Composite Science – Engineering and Physics (PHCS)

Biology
BIOL 112/114 General Biology I/Lab 4
BIOL 113/1115 General Biology II/Lab 4

Chemistry
CHEM 133/131 General Chemistry I/Lab 4
CHEM 134/132 General Chemistry II/Lab 4

Physics
Choose 8 additional hours (7 must be advanced from PHYS 300-499) 8
PHCS TOTAL 24

[1]Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

OTHER REQUIREMENTS

Teacher Education Requirements
EDUC 211 Educational Foundations and Multicultural Perspectives ..... (3)[1]
EDUC 221 Educational Psychology ..... (3)[1]
EDUC 412 Secondary Curriculum and Media (capstone course) 3
EDUC 432 Secondary Management and Methods (capstone course) 3
EDUC 476 Effective Strategies for English Language Learners 3
EDUC 490 Student Teaching (capstone course) 6
READ 322 Reading in Secondary Content Areas 3
SPED 371 Teaching Students with Special Needs (writing-intensive course) 3

Other Required Courses
ENGR 115/116 Introduction to Engineering and Physics 4
PHIL 379 Philosophy, Religion and Science ..... (3)[1]
TOTAL 25

[1]Hours (in parentheses) may also fulfill university requirements and are not included in total major hours

ELECTIVES

Minimum 5

TOTAL MAJOR HOURS 72

CRITERIA FOR ADMISSION TO TEACHER EDUCATION

In accordance with Texas state law, students must meet the admission criteria described on page 114.

OTHER GRADUATION REQUIREMENTS

Minimum GPA in major requirements 2.75
Minimum GPA for graduation 2.75
Minimum advanced hours 33
Minimum total hours 128

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

ABILENE CHRISTIAN UNIVERSITY

LIBRARY

M E M O R A N D U M

DATE: October 23, 2014

TO: Dr. Tim Kennedy and Mr. Rich Jinkerson

FROM: Mark McCallon, Associate Dean for Library Services

RE: New Course Proposal, ENGR 332 – Mechanics of Materials

The library has examined the course proposal and is able to support the proposed course. Please contact your librarian liaison, Mark McCallon (mccallonm@acu.edu), if additional library resources are needed to support the proposed course. Thank you.

October 23, 2014

Mr. Rich Jinkerson
Foster Science 317
Abilene Christian University
325-674-2165
Email: Richard.jinkerson@acu.edu
Re: Review of ENGR332: Mechanics of Materials

Dear Professor Jinkerson,

Thank you for the submission of ENGR332: Mechanics of Materials. I reviewed the syllabus based on the ACU Syllabus Guidelines. Please check the attached list, which indicates whether items have been addressed.

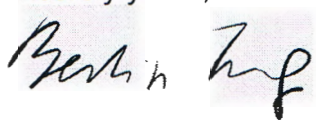
In addition, I also reviewed the syllabus from an instructional design perspective and here are changes that I suggest you make:

1. Is it possible to add a section to describe the format of your class? For instance, is your class consisting mainly of lectures, hands-on activities, or discussions?
2. Your grading section does not include a point value for each assessment activity. Though I understand it does not make much difference how many points you assign for each activity as you use a weighted grading method, many students find it helpful to see how their grades add up. It might benefit them to assign some raw points, for instance, you will have 10 homework assignments, each worth 10 points, and together they will be worth 50%.
3. Could you please add a section explaining how you measure participation?
4. I cannot tell from your daily schedule which ones are the "assignments" you explained earlier. Is the date you wrote supposed to be the deadline for submission? Is the deadline the beginning of class, the previous day, or another time?
5. Your terminology for exams is different. In the grading section, you have exams 1-4 and in the daily schedule you have tests 1-4. Are they the same? I just want to make sure.

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,



October 24, 2014

Mr. Rich Jinkerson
Foster Science 317
Abilene Christian University
325-674-2165
Email: Richard.jinkerson@acu.edu
Re: Review of ENGR332: Mechanics of Materials

Dear Professor Jinkerson,

Thank you for discussing the revisions with me, and the changes you have made to the syllabus of ENGR332: Mechanics of Materials based on my letter dated October 23, 2014 . The changes make the syllabus a stronger one in my opinion. From the discussions I also understand why you keep certain items the way they are and I find that to be completely understandable.

I really appreciate the fact that you take the comments we made very seriously, and everything you have done to improve your syllabus for students.

If there is anything that you think that the Adams Center can help you with, please let us know.

Sincerely yours,