

Approval Chart for Curriculum Changes

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

Course Number PHYS/ENGR 362 or Degree Plan(s) _____
 State the requested change and reason. A memo may be attached if more space is necessary.

We are proposing to cross-list PHYS 362 with ENGR 362. PHYS 362 is a course that can serve as an important elective for engineers interested in optical systems. This will provide additional options for advanced electives in our engineering program. The suggested course number will be ENGR 362.

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

Change to a Course		COUNCIL ³								
		Dept./School	College Academic	Deans	TEC	UGEC	UVAC	GRAD	Provost	President
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>U</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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		COUNCIL ³							
	Change to a Degree Plan	Dept./School	College Academic	Deans	TEC	UGEC	UUAC	GRAD	Provost
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
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
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
8.	Major — Discontinue (proposed by the department or college)	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
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
16.	Degree — Discontinue (proposed by the department or college)	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							
	Provost-Proposed Change	Provost	Department	Dean	TEC	UUAC	Graduate	Faculty	President
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

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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.

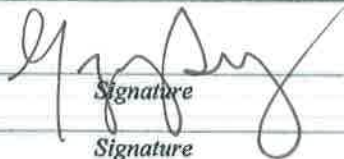
⁷ The UUAC approved the clarification that "general requirements for graduation" means the enumerated items in the "General Requirements for Bachelor's Degrees" section of the catalog.

Revised 3-8-17

Curriculum/Catalog Changes Signature Page

Department/School Chair(s)	
 Signature	11/27/18 Approval date
_____ Signature	_____ Approval date

College Academic Council(s)	
 Signature	2-22-19 Approval date
_____ Signature	_____ Approval date

Dean(s)	
 Signature	3/1/19 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

PHYS/ENGR 362 – Optics 3 hours, Fall 2018

Location: OSC 345

Time: MWF 2-2:50

Prerequisites: PHYS 222/PHYS 223, MATH

186 Corequisite: PHYS/ENGR 363

Prof: Dr. Larry Isenhower

Email: ldi00a@acu.edu

Phone: 325-674-2165

Office: Onstead 123E

Office hours: MWF 10-11:00 am, TR 8:30-11:00 am, other times by appointment

The mission of Abilene Christian University

The mission of Abilene Christian University is to educate students for Christian service and leadership throughout the world.

The mission of the College of Arts and Sciences

The College of Arts and Sciences engages students with humanity's greatest ideas to create understanding, apply insights, and serve the world as Christian thinkers and problem solvers.

The mission of the department of Engineering and Physics

The faculty of the department of Engineering and Physics admire God's handiwork in the laws of the universe, and they seek to help students understand and apply those principles to solve big problems while improving the lives of people around the world.

Course Description:

Light, lenses, aberrations, diffraction, interference, polarization, resolving power, coherence, Fourier transforms, spectroscopy.

Audience:

This course is aimed at physics majors and engineering majors interested in optical science and engineering. Typically it is taken during the junior year.

Outline of topics:

- I. Geometric Optics
- II. ABCD matrix techniques
- III. Review of E&M theory
- IV. Material effects on light
 - a. Lorentz model of a dielectric
 - b. Model for a conductor
- V. Interference
 - a. Interferometers
 - b. Fabry-Perot cavities
- VI. Gaussian Beams

- VII.** Polarization
 - a. Jones calculus
 - b. birefringent materials
- VIII.** Fresnel Coefficients
- IX.** Thin films
- X.** Diffraction theory and Fourier optics
 - a. Fraunhofer diffraction
 - b. Convolution theory
 - c. Fresnel diffraction
- XI.** Special interest topics

Timeline:

Week	Topic
1	Geometric Optics
2	ABCD Matrices
3	Review E&M Theory and Material effects on light
4	Interference
5	Gaussian Beams and Exam 1
6	Fabry-Perot Cavities
7	Polarization
8	Fresnel Coefficients
9	Thin Films
10	Thin Films
11	Diffraction Theory
12	Diffraction Theory
13	Fourier Optics
14	Coherence theory and Lasers
15	Lasers and special interest topics

Format of Course:

The course uses a lecture format where material is introduced and discussed and then students do homework to practice the knowledge and skills gained in class. In addition students will gain experience in reading current research papers and presenting those papers to their classmates.

Required Texts:

Classical and Modern Optics by Daniel Steck

<http://atomoptics-nas.uoregon.edu/~dsteck/teaching/optics/optics-notes.pdf>

Physics of Light and Optics by Justin Peatross and Michael Ware

<http://optics.byu.edu> (either just a pdf or link to get book printed)

Learning Objectives:

	Competency	Measurement
1	An ability to identify, formulate, and solve complex physics problems by applying principles of physics, science, and mathematics	classwork, homework, and exams
2	An ability to communicate effectively with a range of audiences	homework and journal club presentations
3	An ability to acquire and apply new knowledge as needed using appropriate learning strategies	homework and journal club
4	An ability to use computational tools to produce and present solutions to problems.	homework

Grading:

5% Online pre-lecture activities
10% Journal Club presentations and discussions
5% In-class participation
30% Homework Assignments
30% 2 midterm exams
20% Comprehensive final

Scores will be converted to grades according to a standard scale:

A: 90%-100%
B: 80%-90%
C: 70%-80%
D: 60%-70%

F: 0%-60%

Online Pre-Lecture activities:

Before many lectures there will be questions posted to the Canvas site. These questions are graded on participation only, but if I feel you are not putting forth reasonable effort you may lose points for not participating as expected. These questions are designed to: highlight important material in the book, provoke thought about some more difficult concepts, inform me about areas needing further discussion in class, or because I hope it will be fun and/or interesting to you.

Journal Club:

Every week of the semester one student will give a 7 minute presentation on a paper related to optics during class on Friday. The schedule will be setup during the first week of class so each student will know her/his assigned presentation days. The expectation is that you will provide a 7 minute oral presentation of the paper and be expected to answer questions for a few minutes afterward. The goal is for this to take no more than 15 minutes of classtime each week.

The paper you present can be anything related to optics. This means current or historical papers are perfectly acceptable. "Related to optics" will be fairly loosely defined and if it isn't obvious where the relationship is it should be clearly presented.

Each presentation should contain: title, author(s), and publishing journal or book, an introduction to the background for the paper, a summary of the main point(s) of the paper, and a conclusion stating reasons for relevance to the field as well as what was interesting to you and caused you to select it. Accompanying visuals are encouraged either as computer projections, printouts, or use of the boards. You may also play a video but these should be limited to no more than 2 minutes of the 7 minute presentation time. (You can ask to show a longer video as part of the question session after the presentation.)

Students will be expected to be attentive to the presentation and ask appropriate questions afterward. In addition each student will fill out an anonymous grading rubric to help scoring of presentations.

The goal of this is to prepare students for future presentations before other scientists, managers, etc.

physics.aps.org - APS summaries of recent important papers

physicstoday.org - Physics Today get it free by joining the society of physics students

sciencemag.org - Science magazine online

nature.com - Nature magazine online

arxiv.org - pre-print archive (the optics section is a good starting point but other areas contain optics too)

spectrum.ieee.org - and other IEEE journals

www.ncbi.nlm.nih.gov/pubmed - PubMed allows searching through all medical journals at once, search for a topic, tool, etc.

Homework:

There will be weekly homework assignments throughout the semester. Late work will not be accepted. You should turn in partial assignments to receive partial credit. You are strongly encouraged to work with fellow students but all work must be yours. Direct copying is forbidden and will result in loss of points.

The problems will be graded according to the following rubric:

Completeness: 2 points

Clarity: 2 points

Correctness: 4 points

Plausibility: 2 points

This rubric is designed to encourage you to write full and complete solutions with explanations beyond the simple equations. Your solution should be similar to a worked example in your old EP I text, i.e. another student should be able to look at your solution to the problem and be able to follow everything that you do. This also means the emphasis is not on getting the exact right answer at the end. Many of the problems take 1-3 pages of algebra to solve introducing many possibilities to make a minor mathematical mistake, but as long as your solution is clear, complete, and includes an evaluation of the plausibility of your answer you can earn 60% with a completely incorrect solution.

You are also strongly encouraged to use computer mathematics programs to aid in your solutions. If you choose to use these be sure your code is included and easily readable. It may be necessary to write additional notes on your code to explain what is going on. You may assume that I'm familiar with the basics of whatever program you are using and don't need to explain things like print statements, derivatives, integrals, etc.

Exams and Final:

There will be two exams given during the semester. This will be given during class time. Due to the time needed for full calculations of many problems in this subject these tests are necessarily focused on conceptual knowledge and understanding of the material. Example questions include explaining how to solve a problem, describing relationships between equations and the physical world, setting up various parts of homework style problems, and some full solutions to problems when appropriate. Roughly 70% of the exam is based on conceptual explanations and 30% is based on calculations/equations. No computers or internet connectable devices will be allowed during the exams.

Attendance:

You are expected to attend class. There is a high possibility that I will provide additional information during class you will want when studying for tests or completing homework assignments. If you feel that you are not getting the help you need in class please let me know so I can adjust things or find other accommodations with you. (If I don't know you need help, then I can't help!) Questions are extremely important for your learning (and for your friends too worried to ask). I **need your feedback** to know both when you understand and **especially** when you don't.

Athletes and other special school events **must** give **prior** notice for an absence to be marked as excused. To be excused for other absences, send me an email to let me know within 1 week of the absence. I will trust you and do not need to see full documentation, however if you do miss multiple days in a row please provide more information and help me work with you to make up any assignments you miss. If you are absent when an assignment was due, turn it in via Canvas if appropriate or on the day you return to class for submissions on paper.

Behavior:

Please remember to respect your fellow students. The topics covered in this class may be completely new for some students and some directly conflict with everyday experiences so do not laugh or joke about questions other students may have as they are likely to be hesitant to ask already. Questions addressed to the whole class are strongly encouraged because most likely you are not the only one confused or lost. Electronic devices will be allowed for note taking purposes, but I **strongly** recommend hand-writing notes as research shows that is more effective for most people. If you know you are easily distracted it is better to sit towards the front so there are fewer people in front of you.

Academic Integrity:

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/community/offices/administrative/office-of-the-provost/academic-integrity-policy.html>

ADA Compliance Policy:

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 email alpha@acu.edu call our office directly at 325-674-2667.

Anti-Harassment Policy:

Consider adding the following text from the harassment policy of ACU:

“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](#).

Note:

This syllabus is as accurate as possible at this time; however, it may be necessary to change certain aspects to improve the course or address concerns arising during the semester. These changes will be announced in class and on Canvas.