

PHYS 442

ORIGINATOR'S SECTION:

1. College: CHABSS CoBA CoEHHS CSM
 Desired Term and Year of Implementation (e.g., Fall 2008):
 Spring 2017

2. Course is to be considered for G.E.? (If yes, also fill out appropriate GE form*) Yes No

3. Course will be a variable-topics (generic) course? Yes No
 ("generic" is a placeholder for topics)

4. Course abbreviation and Number:* PHYS 442

5. Title: (Titles using jargon, slang, copyrighted names, trade names, or any non-essential punctuation may not be used.)
 Physical and Geometric Optics

6. Abbreviated Title for PeopleSoft:
 (no more than 25 characters, including spaces)
 Optics *full title*

7. Number of Units: 3

8. Catalog Description: (Not to exceed 80 words; language should conform to catalog copy. Please consult the catalog for models of style and format; include all necessary information regarding consent for enrollment, pre- and/or corequisites, repeated enrollment, crosslisting, as detailed below. Such information does not count toward the 80-word limit.)
 Advanced treatment of physical and geometrical optics. *Subjects* Topics may include: lenses and aberrations, polarization, fiber optics, interferometry, spectroscopy, photonics, lasers, and optical sensors. Prerequisite: PHYS 321, recommended MATH 346 *(previously PHYS 490-5)*

9. Why is this course being proposed?
 To better serve the students pursuing one of the applied physics major tracks or a physics minor. The material covered is beneficial to students continuing in both industry and academia and warrants its own course.

10. Mode of Instruction*
 For definitions of the Course Classification Numbers:
http://www.csusm.edu/academic_programs/curriculumscheduling/catalogcurricula/DOCUMENTS/Curricular_Forms_Tab/Instructional%20Mode%20Conventions.pdf

Type of Instruction	Number of Credit Units	Instructional Mode (Course Classification Number)
Lecture	2	C-2
Activity	1	C-7
Lab		

11. Grading Method:*
 Normal (N) (Allows Letter Grade +/-, and Credit/No Credit)
 Normal Plus Report-in-Progress (NP) (Allows Letter Grade +/-, Credit/No Credit, and Report-in-Progress)
 Credit/No Credit Only (C)
 Credit/No Credit or Report-in-Progress Only (CP)

12. If the (NP) or (CP) grading system was selected, please explain the need for this grade option.

13. Course Requires Consent for Enrollment? Yes No
 Faculty Credential Analyst Dean Program/Department - Director/Chair

14. Course Can be Taken for Credit More than Once? Yes No
 If yes, how many times? (including first offering)

15. Is Course Crosslisted: Yes No
 If yes, indicate which course and check "yes" in item #22 below.

16. Prerequisite(s): Yes No PHYS 321 *Recommended: Math 346*

17. Corequisite(s): Yes No

18. Documentation attached:

* If Originator is uncertain of this entry, please consult with Program/Department Director/Chair.

Subject: FW: MATH Sign-off PHYS 442

From: Wayne Aitken

Sent: Monday, February 01, 2016 12:37 PM

To: Virginia Mann <vmann@csusm.edu>

Cc: Suzanne Moineau <smoineau@csusm.edu>; Laurie Schmelzer <lschmelz@csusm.edu>

Subject: Re: MATH Sign-off PHYS 442

Hi Virginia,

I have reviewed it and will sign off on it.

Best,

Wayne

From: Virginia Mann

Sent: Tuesday, January 26, 2016 10:19 AM

To: Wayne Aitken <waitken@csusm.edu>

Cc: Suzanne Moineau <smoineau@csusm.edu>

Subject: MATH Sign-off PHYS 442

Good morning Wayne,

The UCC is currently reviewing PHYS 442 – link below. They request that Mathematics review this new course, and let us know if you have any comments or concerns. The PHYS 442 syllabus lists MATH 346 as “recommended preparation” for PHYS 442. Thanks so much.

[PHYS 442](#) - Physical and Geometric Optics

Virginia

Virginia Peters Mann

Curriculum Specialist

Academic Programs

CRA 5201-B

(760) 750-8887

Professor: Jane Doe
 SCI2, room 503
 Office Hours: M/Th 11:30am

jdoe@csusm.edu
 (760) 750-9999

Webpage: <http://cc.csusm.edu> (Useful information, updated throughout the semester!)
 Login with your @csusm.edu username and password.

Lectures: TBD:

Office hours: TBD

Learning objectives: My learning goal for students in this course is for students to develop a familiarity with the physics ideas and problem solving methods involved in optics. I hope this course will give students practical experience with the physics of optics and optical systems, including an introduction into some basic optic theories. By the end of this course you should be able to use the wave and ray models of light to analyze light path and intensity in an optical system. This includes analyzing interference, reflection, refraction, and polarization in optical systems consisting of lenses, mirrors, gratings, and optical fibers. The course work will follow the book *Optics* by Eugene Hecht, broken down as follows

Topic	Detailed description
Mathematics of wave motion (chapter 2) (~ 1 week)	1D waves, harmonic waves, plane waves, phase velocity, wave equation
Electromagnetic theory (chapter 3) (~ 1 week)	Maxwell's equations, E&M waves, radiation pressure, atoms and light, dispersion
Propagation of light (chapter 4) (~ 1 weeks)	Huygens principle, reflection and refraction, Fermat's principle, Fresnel's equations, total internal reflection
Geometrical Optics (chapter 5) (~ 2 weeks)	Paraxial theory, refraction at spherical interfaces, thin lenses, mirrors, optical fibers
Superposition of waves (chapter 7) (~ 2 weeks)	Addition of waves, optical path difference, interference, standing waves, beats, Fourier analysis
Polarization (chapter 8) (~ 2 weeks)	Linear & circular polarized light, Malus's law, birefringence, retardation plates
Interference (chapter 9) (~ 2 weeks)	2 slit experiment, reflection from thin films, Newton's rings, Michelson interferometer, Fabry-Perot interferometer
Diffraction (chapter 10) (~ 2 weeks)	Fraunhofer diffraction, diffraction from single & double slits, gratings, circular apertures, Fresnel diffraction
Fourier optics (chapter 11) (~ 2 weeks)	Fourier transform, Dirac delta function, convolution integral, convolution theorem, Fourier methods in diffraction theory

Course description: Advanced treatment of physical and geometrical optics. Topics may include: lenses and aberrations, polarization, fiber optics, interferometry, spectroscopy, photonics, lasers, and optical sensors. Prerequisite: PHYS 321, recommended MATH 346

Pre/co-requisites: The prerequisite for this course are Classical Electromagnetism (PHYS 321). However, it is also recommended that you have taken Mathematical methods for physics (MATH 346).

Required Text: *Optics*, Hecht, E. (Addison-Wesley)

Recommended/Supplemental Text:

Introduction to Optics by Frank L Pedrotti, Leno M Pedrotti, & Leno S Pedrotti (Addison-Wesley)

Physics of Light and Optics, J. B. Peatross and M. Ware (free online text)

Geometric Optics, J. B. Tatum (free online text)

Introduction to Modern Optics, G. R. Fowles

Lecture format: This is a lecture/activity course. Some class time will be dedicated to lectures and some time to hands on activities. Students are expected to complete all activities and attend lectures.

Expectations: I expect everyone involved in this course to behave in a respectful and appropriate manner. If a case arises where this expectation is not met I will deduct what I deem an appropriate percentage from the violator's final course grade.

Exams/quizzes (30% of total grade):

2 exams throughout the semester. The date of these exams remains to be determined.

Policy for missed exams: Exam dates will be given at the start of the semester. Students are expected to schedule around these times. If a student misses an exam without approval prior to the exam date the student will receive a zero for that exam. Exceptions may be made for special situations such as illness. A doctor's note may be required.

Final Exam (20% of final grade): All topics covered during the semester are fair game for questions on this exam.

Assignments/Activities (50% of final grade): In class activities will be performed throughout the year using the equipment provided. The equipment can NOT BE REMOVED FROM THE ROOM. Reports will be written up and submitted at a later date. Late reports will be strictly penalized. In addition there will be take home problem sets students must work through individually.

Writing requirement: The in class activities will be involve written reports formatted like that of a research article in a typical science journal (see, *Physical Review Letters* for example). This will satisfy the writing requirement for the course.

Grading Scale: A > 90% > B > 75% > C > 60% > D > 50% > F

Academic Honesty Policy: Don't cheat (yourselves)!

Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral presentation assignments must be original work. All ideas/material that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty, in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole."

Incidents of Academic Dishonesty will be reported to the Dean of Students. Sanctions at the University level may include suspension or expulsion from the University

More on the CSUSM's academic honest policy can be found at
http://www.csusm.edu/policies/active/documents/Academic_Honesty_Policy.html

Disability services: Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at

(760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with me during my office hours in order to ensure confidentiality.