



PIMA COMMUNITY COLLEGE

West Campus

TEC 042

Summer 2008 – 5/27/08 – 7/11/08

Course Name: TEC 042 Careers in Optics Technology/3 cr. hr./3 periods – CRN
Instructor: Anthony Tanbakuchi
Class Time: M, Tu, W, Th 8:00 – 9:35 a.m.
Class Location: Tortolita E106, West Campus
Office Hours: By appointment
Office Location: Office 166, Radiology Research Labs, University of Arizona
Phone: 626-4500
E-mail: tec042@tanbakuchi.com
Best Way To Reach Me: Email
Class Website: <http://www.tanbakuchi.com/courses/tec042/>
Key Dates:

First day of classes:	May 27 2008
Last day of classes:	July 11 2008
Last day to withdraw:	June 30, 2008
Final Exam Week:	July 10 2008
Holidays (no class):	July 4, 2008

Grading: Grades will be determined as follows:
900-1000 points = A
800-899 points = B
700-799 points = C
600-699 points = D
599 and below = F

There will be no opportunity to earn extra credit points.

A grade of "I" (incomplete) will be awarded only if a very small portion of the work remains undone and if the student is passing with a C or better, and at the instructor's discretion. Incompletes are very rare and are an opportunity to make up missed work, not a new start. A grade of W may be given if a student requests in writing prior to the last day of class, providing the student has been attending the class and participating, and at the instructor's discretion.

Note: The Pima Community College Board adopted the following changes in grading policy:

- An incomplete grade (I) becomes an F if work is not completed in one year.
- Instructors can no longer award students a Y grade.
- A grade of C or better in core and general education courses is required for courses fulfilling graduation requirements. In other words, D grades do not fulfill graduation requirements if they are received in core and general education courses.

Attendance:

Regular attendance is essential in any technology course. Roll will be taken each class period. Any student who misses 3 or more classes may be dropped from the class. However, withdrawing from the class is the student's responsibility; if you stop attending class, you will most likely receive an F for the course grade. You are expected to participate in discussions as well as to ask and to answer questions in class. The quantity and quality of your participation will greatly enhance what you learn. **Attending class regularly will contribute to your successful completion of this course.** Please call me **in advance** if you will not be able to attend a class session. Points are given for attendance. If you come to class (either lecture and/or lab) late or leave early **you will lose all of the attendance points for that day.** Please make sure that you are there during the scheduled class time. This is a commitment that you made when you signed up for the class.

Homework:

Homework will be assigned on a regular basis, and collected. The purpose of homework is to reinforce what you learned in class and to prepare you for the quizzes, midterm and final. If you find yourself having difficulty, please see the instructor for help and/or advice. **Homework will be collected at the beginning of class on the day that it is due. Late homework will not be accepted under any circumstance and will be assigned a grade of zero.** It is your responsibility to hand in the homework early or to make arrangements to have a fellow student hand in your homework if you will not be attending class on the day the homework is due.

Test/Quizzes:

Quizzes will be given on a regular basis. They will cover the reading material and the material given in the lectures. The purpose of the quizzes is to test your knowledge of the material. If you do not do well on a given quiz, this means that you have not mastered the material and must put more effort into learning it. Quizzes will be given at the testing center. The Midterm and Final will be given in class. If you miss a quiz you must make arrangements with me on your first day back to school to make up the quiz. **The missed quiz must be made up within one week of the day when it was given otherwise it will be assigned a grade of zero. If you do not take the Midterm or the Final or both you will receive a failing grade (F) in the class.**

For the problems in the homework, Midterm and Final you must show all your work to get partial credit. This means you must write down the equation, plug in numbers into the equation, calculate and write your answer with the appropriate units. When doing this work you must write neatly and put a box around your answer. The multiple choice problems on the quizzes, midterm and final, Please choose the most correct answer.

Labs:

Labs will be collected at the beginning of the lab period on the day that it is due. Late labs will not be accepted under any circumstance and will be assigned a grade of zero. It is your responsibility to hand in the lab early or to make arrangements to have a fellow student hand in your lab if you will not be attending class on the day the lab is due.

Grade calculations:

Total points = Quizzes + Final Exam + Lab + project + Attendance + Homework

Quizzes	200 pts.
Final Exam	200 pts.
Lab	200 pts.
Attendance	100 pts.
Homework	300 pts.
 Total points	 1000 pts.

To calculate your grade for each category proceed as shown below:

- Quizzes = (Average of all Quizzes) x (2)
- Final Exam = Total points on Final Exam
- Lab = (Average of all Labs) x (2)
- Attendance = (Total days attended / Total days in the semester) x (100)
- Homework = (Average of all Homework) x (30)

Total points = Quizzes + Midterm Exam + Final Exam + Lab + Attendance + Homework

Example of grade calculation:

Quizzes:	80, 100, 90, 70, 80	Quiz Average = 84	(84)x(2)	= 168
Final Exam:	174 out of 200 points			= 174
Lab:	95, 98, 87, 83, 92	Lab Average = 91	(91)x(2)	= 182
Attendance:	19 days attended out of 22 days so far in the semester		(19/22)x(100)	= 86
Homework:	9, 8, 6, 10, 7	Homework Average = 8	(8)x(30)	= 240
			Total points	= 850
			Grade	= B

Class Conduct:

- Because of insurance limitations, non-registered visitors are not allowed at class sessions or on field trips.
- Possession of drugs, alcohol or firearms on college property is illegal.
- Eating, drinking, smoking or soliciting are not allowed in classrooms.
- Pets, telephones, pagers and other electronic devices that distract students are not allowed in classrooms.
- Students creating disturbances that interfere with the conduct of the class or the learning of others, violations of the *Student Code of Conduct*, will be referred to the Division Dean and/or the Dean of Students.
- Disruptive behavior will not be tolerated and can be cause for being dropped from the class. Disruptive behavior is defined as behavior that is disruptive to the learning process and outside of normal behavior parameters. Please see the *Student Code of Conduct* for particulars, but examples of disruptive behavior are inappropriate talking, arriving late or leaving early, sleeping or doing other class work in class, etc.
- Please refer to the *Student Code of Conduct* for additional requirements relating to student behavior.

Academic Integrity:

Pima Community College considers violation of scholastic ethics, including plagiarism, as serious offenses, which may result in failure of an assignment, the course, or possible expulsion. All work done for this class must be your own. Actions constituting violations of scholastic ethics include:

1. Cheating on a test includes but is not limited to copying another student's work, using, during a test, materials that have not been authorized.
2. Plagiarism - copying part or all of someone else's work and representing it as one's own.
3. Collusion - obtaining from or giving to another student unauthorized assistance.
4. Compromising instructional and test materials - unauthorized acquisition of instructional and/or testing materials.
5. Misrepresentation/fraud - using false records, false identification papers, or unauthorized ID cards or gaining computer access to official College documents.

Students are expected to abide by the *Student Code of Conduct* which can be found at:

<http://www.pima.edu/~coadmissions/studresp.htm>

And the scholastic ethics code:

<http://www.pima.edu/dept/studresp/ethics.htm>

Americans with Disabilities Act:

Pima County Community College District strives to comply with the provisions of Title III of the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973. Reasonable accommodations including materials in an alternative format, will be made for individuals with disabilities when a minimum of five working days advance notice is given. Accommodations cannot be made without verification of the need. For the general public, please contact the PCC information line at 206-4500; for PCC students, contact the appropriate campus Disabled Student Resources Office, at (520) 206-6688.

Course Description: Introduction to optics technology. Includes the use of lenses, Fresnel lenses, diffraction gratings, polarizers, concave and convex mirrors, lasers, holograms and optical fibers.

Prerequisite(s): None

Text: None – Instructor generated handouts.

Performance Objectives:

Upon completion of the course, the student will be able to do the following:

1. Construct a Galilean and a Keplerian telescope.
2. Describe refraction.
3. Construct a slide projector.
4. Explain how the Fresnel lens works.
5. Discuss how a grating can be used to separate white light into its various colors.
6. Describe how two polarizers can be used to change the intensity of light passing through them.
7. Explain how concave and convex mirrors work.
8. Discuss how holograms form a three dimensional image.
9. Describe total internal reflection and how optical fibers work.
10. Explain stimulated emission and how lasers work.

Course Outline:

- I. Introduction
- II. Convex lenses
 - A. Refraction of light and Snell's law
 - B. Determine the size and location of an image using ray diagrams
 - C. The magnifying glass
 - D. The Galilean telescope
 - E. The Keplerian telescope
 - F. The slide projector
- III. Fresnel lenses
 - A. How the Fresnel lens works
 - B. Determine the size and location of an image
- IV. Gratings
 - A. How they are constructed
 - B. Separate white light into its components using a grating
- V. Sheet polarizers
 - A. The law of Malus
 - B. Transmission of light through a polarizer and an analyzer
- VI. Concave and convex mirrors
 - A. Law of reflection
 - B. Determine the size and location of an image using ray diagrams
- VII. Holograms
 - A. How they are made
 - B. View a three dimensional image using a hologram
- VIII. Optical fibers
 - A. Total internal reflection
 - B. Show how light bends around a corner using an optical fiber
- IX. Lasers
 - A. Stimulated emission and how a laser works
 - B. The use of lasers in health care
 - C. The use of lasers in manufacturing
 - D. The use of lasers in communication
 - E. The use of lasers in military and space application
- X. Preparing for a Career in Optics
- XI. Industrial Site Operations (visit some optics companies)

Americans with Disabilities Act:

Pima County Community College District strives to comply with the provisions of Title III of the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973. Reasonable accommodations including materials in an alternative format, will be made for individuals with disabilities when a minimum of five working days advance notice is given. Accommodations cannot be made without verification of the need. For the general public, please contact the PCC information line at 206-4500; for PCC students, contact the appropriate campus Disabled Student Resources Office, at (520) 206-6128.

TENTATIVE COURSE SCHEDULE
TEC 042 – Summer 2007 – M, Tu, W & Th classes (7 Weeks)
(Subject to revision by the instructor during the semester)

May	<u>Handout</u>	<u>Lab work</u>
27	Orientation, Introduction & Safety	
28	Handout 1 -	Lab 1 – Handling Optical Elements
29	Handout 2 -	Lab 2 – Plane Mirror
30	Company Tour	
June		
2	Handout 3 -	Lab 3 – Flexible Mirror
3	Handout 4 -	Lab 4 – Spherical Mirror
4	Handout 5 and QUIZ 1	
5	Handout 6 -	Lab 5 – Total Internal Reflection
6	Company Tour	
9	Handout 7	Lab 6 – Optical Fibers
10	Handout 8 -	Lab 7 – Polaroid Sheets
11	Handout 9 and QUIZ 2	
12	Handout 10 -	Lab 8 – Polarization by Reflection
13	Company Tour	
16	Handout 11 -	Lab 9 – Thin Convex Lenses
17	Handout 12 -	Lab 10 – Thin Concave Lenses
18	Handout 13 and QUIZ 3	
19	Handout 14 -	Lab 11 – The Fresnel Lens
20	Company Tour	
23	Handout 15 -	Lab 12 – The Magnifying Glass
24	Handout 16 -	Lab 13 – The Slide Projector
25	Handout 17 and QUIZ 4	
26	Handout 18 -	Lab 14 – The Keplerian Telescope
27	Company Tour	
30	Handout 19 -	Lab 15 – The Galilean Telescope
July		
1	Handout 20 -	Lab 16 – The Hologram
2	Handout 21 -	Lab 17 – The Diffraction Grating
3	Handout 22 and QUIZ 5	
4	No Class	
7	Handout 23 -	Lab 18 – The Spectroscope
8	Handout 24 -	Lab 19 – Viewing Spectral Lines
9	Review	
10	Final Exam	

- Note:**
1. The homework refers to the instructor generated homework which will be given to you in class.
 2. The quizzes will be given on the dates listed above in class.
 3. The quizzes and final will be in class.
 4. The handouts will be given to you in class.

TENTATIVE COURSE SCHEDULE

TEC 042 - Homework

(Subject to revision by the instructor during the semester)

- HW 1 – Instructor Generated Homework #1**
- HW 2 – Instructor Generated Homework #2**
- HW 3 – Instructor Generated Homework #3**
- HW 4 – Instructor Generated Homework #4**
- HW 5 – Instructor Generated Homework #5**
- HW 6 – Instructor Generated Homework #6**
- HW 7 – Instructor Generated Homework #7**
- HW 8 – Instructor Generated Homework #8**
- HW 9 – Instructor Generated Homework #9**
- HW 10 – Instructor Generated Homework #10**

Student Contract
TEC-042 (CRN 31731), Pima Community College, Summer 2008

1. I have received, read, and understand all of the syllabus policies and requirements.
2. The grading and attendance policies outlined in the syllabus have been explained and are clearly understood.
3. I understand that I must spend at least 14 hours per week studying for this class.
4. The instructor has explained the College's guidelines regarding an incomplete grade (I). I understand I must complete 90% of the course requirements in order to receive a grade of incomplete.
5. I also understand that if I work, I can only take the number of credits listed: 40 hrs./week you can only take 3 credit hours; 20 hrs./week you can only take 6 credit hours; Not working you can take 9 credit hours.
6. I will check my email and the course website in a timely manner.
7. I give permission for my instructor to email any grades and materials associated with my student record for the duration of the course.
8. I understand that academic integrity is taken extremely seriously in this course and I am aware that any form of unethical conduct such as cheating or aiding cheating will result in an instant F in the course, a report of the incident to the department chair, and more.
9. I will silence all electronic devices during class. If my cell phone, beeper, or any other alarm / device is heard during class I understand that I will be asked to leave. (If extraordinary circumstances require otherwise, I will inform the instructor before class.)
10. I will raise my hand, and speak when called upon.
11. In the classroom I will conduct myself in a respectful manner towards the instructor and fellow students such that no one's safety, ability to learn, or ability to participate is jeopardized. Moreover, I will affirm the importance and value of each individual in the class.
12. I acknowledge that the instructor is responsible for the class as a whole, and will defer to his requests regarding conversation and comment length.
13. I am aware that developing a complete grasp of statistics requires the use of technology. I will make the required arrangements to have a computer available to do the homework (computers are available on campus).
14. I will read and spend the necessary time to understand all the sections of the book covered in the course, do the assigned homework, and study for the exams.
15. I will not be a negative, hostile, dead, or toxic energy drain. I will be a positive, energetic addition to this class.

I sign this agreement to indicate that I agree with and will comply with the above statements.

Print your name

Student signature

Date

TECHNOLOGY PROGRAM
Pima Community College - Summer, 2008
Student Profile

If any of these items are not applicable to your situation please insert N/A.

Name _____

Home address _____

City _____ State _____ Zip Code _____

Home phone _____ Work Phone _____

Email address _____

Employer _____

Present occupation _____

Class number TEC-042 _____

1. How many hours per week are you working?
2. How many credit hours are you taking this semester?
3. How did you find out about the TEC program at Pima Community College?
5. What are your goals for the future?
6. Describe the type of job you want after you graduate with your degree.
8. Briefly discuss what you would like to learn from this class, including any goals it might help you accomplish.
9. What was the last math class that you took (give the name and number) and the grade you received?
10. Have you taken a physics class? (If so, what was the class name and your grade?)
11. Is there anything else I should be aware of?