ENME 808Z

Fundamentals of Optics and Optical Systems for Engineers

M and W 3:30 to 4:45p.m. - Room: (PLS 1176)

Instructor: Dr. Bongtae Han
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REFERENCES:

1. High Sensitivity Moiré: Experimental Analysis for Mechanics and Materials, by D. Post, B. Han and P. Ifju, Mechanical Engineering Series, Springer-Verlag, NY, 1994. (Student edition, 1997)
2. Optics, 4th edition by E. Hecht, Addison-Wesley, 2002.
3. Fundamentals of Optics, 4th edition by F. Jenkins and H. White, McGraw-Hill, 1965
4. Experimental Stress Analysis, 3rd. edition, by J. W. Dally and W. F. Riley, McGraw-Hill, Inc., 1991.
5. Photomechanics for Engineers, Pramod Rastogi, ed., Springer-Verlag, 2000.
6. Handbook of the Moiré Fringe Technique by K. Patorski, Elsevier, 1993
7. Optical methods of Engineering Analysis by G. Cloud, Cambridge, 1995

COURSE OBJECTIVE:

(1) To familiarize students with the optical principles and applications, and
(2) To help them learn the method details and develop skills for research investigations.

CLASS WAITING:

If an instructor does not come to class within the first fifteen minutes, students are authorized to leave.

HOMEWORK:

1. Reading assignments will be given at each class and questions about the assigned reading materials will be answered at the next class.

2. Representative homework problems of material covered will be assigned. Students are encouraged to discuss homework problems with classmates.

3. The assignments will NOT be graded but solutions will be discussed in class.

TEST:

There will be one 75-minute test during the semester. If a test is missed, make-up grades will be determined as follows:

Test grade = make-up for cases of documented illness or family emergency.
Test grade = make-up grade x (class average/100) for all other cases.

A make-up grade will be determined from either a make-up test or the performance on the final exam for the corresponding material. I reserve the right to choose which option to use.

CLASS PROJECT:

Students will be involved in a class project. The team will choose a topic for the project, but it should be discussed and approved by the instructor in advance. The project will be graded based on report and presentation.

BASIS OF FINAL GRADE:

Mid-term Exam	40%
Final Exam	40%
Class project	20%

OFFICE HOURS: 12:00 to 2:00pm on Monday or by appointment

ACADEMIC INTEGRITY POLICY:

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information, see the "General Course Policies" section.

Please note that <u>any</u> alteration (i.e. additions, subtractions, and/or modifications) to graded exams, quizzes, homework, and groupwork is <u>strictly prohibited</u>. *Such alterations are considered an act of <u>academic dishonesty</u> and will be reported to the Office of Student Conduct and the Student Honor Council*.

Lecture Schedules:

The class schedules are subject to change without prior notice, if necessary. The instructor reserves the right to change them.

No.	Subject	Contents
1	Introduction	Course objective; Optics overview
2	Nature of light I	Rectilinear propagation of light; Law of reflection and refraction; Total internal reflection; Wave optics
3	Nature of light II	Polarization (linear, circular and elliptical); Optical anisotropy (or birefringence)
4	Nature of light III	Dielectric and metallic reflection; Phase change upon reflection; Diffraction
5	Optical elements I	Lenses (simple lens formula, lens types, aberrations); Mirror, window and prisms;
6	Optical elements II	Polarizer; Wave plates (quarter, half, and full retardation plates);
7	Optical elements III	Diffraction grating (linear and crossed line); Applications
8	Optical interference I	Optical path length; Interference of light; Pure two beam interference
9	Optical interference II	Classical interferometry
10	Optical interference III	Impure two beam interference; Image processing
11	Optical interference IV	Dielectric coating (anti-reflective and reflective coating)
12	Optical interference V	Multiple beam interference; Coherence (spatial and temporal)
13	Optical interference VI	Non-coherent superposition; White light interferometry
14	Geometrical interference	Mechanical interference; Amplification
15	Application I	Optical fundamentals used in advanced microscopy
16	Application II	Optical fundamentals used in liquid crystal display (LCD)
17	Application III	Deformation measurements
18	Application IV	TBD
19	Application V	TBD
20	Review and Discussion	