

OPTI 600D: Diffractive Optical Elements – Theory and Design

Effective Fall Semester 2015

Course Description:

This course includes a physical optics approach to understanding computer-generated diffractive optical elements (DOEs) and their differences with respect to refractive lens elements. Included in the discussion are gratings, focusing elements, aberration compensators, servo-signal generators, axicons, computer-generated holograms (CGHs) and other elements. Design techniques using Zemax ray-tracing software will be demonstrated, and an open-source Matlab program called OptiScan will be used for project assignments.

Pre-requisites:

OPTI 505, Access to computer with Matlab

Number of Units/ component:

1 Unit – Can be distance learning.

Locations and Times:

TBA, preferred as 2nd component of the modular class schedule.

Instructor Information:

Prof. Tom D. Milster
Office 729, Optical Sciences
520-621-8280
milster@optics.arizona.edu
Office hours: M and F 1-3pm.

Expected Learning Outcomes:

- Theoretical understanding of several types of computer-generated diffractive optical elements (DOEs) and how they can be used in optical systems.
- Ability to design gratings, focusing elements, aberration compensators, and other types of DOEs with Zemax and Matlab software.
- Understanding of how DOEs are used in optical systems and other applications.

Required Texts:

Course notes will be available on D2L.

Topics and/or general calendar:

PRELIMINARY LECTURE SCHEDULE:

1. Physical optical principles for computer-generated DOEs;
2. Gratings I – basic principles and configurations;
3. Gratings II – advanced configurations and spectrometers;
4. Gratings III – design and analysis;
5. Fresnel zone plate (FZP) and the diffractive Fresnel lens (DFL);
6. Design techniques and analysis for FZPs and DFLs;
7. Other types of DOEs and applications;
8. Computer-generated holograms (CGHs);
9. Design techniques and analysis for CGHs;
10. DOE fabrication.
11. DOEs generated from Spatial Light Modulators

Number of Exams and Papers:

Course grade is determined from 2 home works and 1 design project. The design project includes a written report.

Course Policies:

Grading Policy

Home works(2)	60% (30% each)
Design project	40%
Total	100%

The grade will be determined according to the cumulative percentage earned such that 85-100% = A, 70-84% = B, 60-69% = C, 50-59% = D, below 50% = E.

Academic Integrity (<http://web.arizona.edu/~studpubs/policies/cacaint.htm>)

According to the Arizona Code of Academic Integrity, “Integrity is expected of every student in all academic work. The guiding principle of academic integrity is that a student’s submitted work must be the student’s own.” Unless otherwise noted by the instructor, work for all assignments in this course must be conducted independently by each student. Co-authored work of any kind is unacceptable. Misappropriation of exams before or after they are given will be considered academics misconduct.

Misconduct of any kind will be prosecuted and may result in any or all of the following:

- Reduction of grade
- Failing grade
- Referral to the Dean of Students for consideration of additional penalty, i.e. notation on a student’s transcript re. academic integrity violation, etc.

Attendance Policy

It is important to attend all classes, as what is discussed in class is pertinent to adequate performance on assignments and exams. If you must be absent, it is your responsibility to obtain and review the information you missed. This is especially important in this course where a substantial amount of course material will emerge through class discussion.

"All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee) will be honored."

Classroom Behavior

The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308, prohibits threats of physical harm to any member of the University community, including to one's self. See:

<http://policy.web.arizona.edu/threatening-behavior-students>.

Students with a Learning Disability

If a student is registered with the Disability Resource Center, he/she must submit appropriate documentation to the instructor if he/she is requesting reasonable accommodations.

(<http://drc.arizona.edu/instructor/syllabus-statement.shtml>).

The information contained in this syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.