OPTI 600A: Photonics in Lens Design
Effective Fall Semester 2014

Course Description:

Understanding of physical optics along with skills to implement it into a ray-trace based optical design software is one of the essential skills for optical engineers and lens designers. In this class, we focus gratings, thin and thick holographic optical elements as an optical component used in modern complex optical system. The course provides fundamental understanding of theories used in optics and photonics system design with grating/holograms as well as skills to implement theories into software codes.

During the 5 week course, student will acquire introductory knowledge of Photonics, fundamental theories in grating/holograms design and be able to implement gratings and holograms to optical systems.

Topics:

1. Image formation theory by holographic optical element
2. Modeling of holographic optical element by ray trace software CodeV
3. Coupled wave analysis to analyze diffraction in volume hologram
4. Modeling of volume hologram in CodeV
5. Rigorous coupled wave analysis software to understand diffraction by gratings.

Pre-requisites:

Familiarity to Ray trace code, CodeV
OPTI 502, 505R, 512R or equivalent.

This class is a prerequisite of OPTI526: Optical Design in Multi-scale Photonic Systems (2 Units)

Number of Units/ component:

1 Unit

Locations and Times:

Dynamically dated session: 08/25/2014- 09/25/2014
Optical Science RM 305
Tue/Thu 8-9:15am
Instructor Information:

Yuzuru Takashima, Ph.D., Associate Professor
Office: Meinel 627
Office Hours: Mondays and Wednesdays, 9-10 a.m., also by appointment
Phone: (520) 626-6992 Fax: (520) 621-4358
Email: ytakashima@optics.arizona.edu

Expected Learning Outcomes:

Being able to

1) design lens and hologram mixed optical system.
2) model lens and hologram mixed optical system by software.
3) effectively bridge photonics design and classical lens design

Required Texts:


Topics and/or general calendar:

Topics:

1. Image formation theory by holographic optical element (Week 1)
2. Modeling of holographic optical element by ray trace software CodeV (Week 2)
3. Coupled wave analysis to analyze diffraction in volume hologram (Week 3)
4. Modeling of volume hologram in CodeV (Week 4)
5. Rigorous coupled wave analysis to understand diffraction by gratings (Week 5)

Course Policies:

Grading Policy

The final grade will be based upon:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homeworks</td>
<td>50%</td>
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<tr>
<td>Term paper</td>
<td>50%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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The grade will be determined according to the cumulative percentage earned such that 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 60% = E.
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](http://policy.web.arizona.edu/threatening-behavior-students).

**Students with Disabilities**

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](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.*