OPTI 600F: Spatial Frequency Analysis of Optical Systems
Effective Fall Semester 2015

Course Description:

This course includes a physical approach to understanding coherent transfer function, optical transfer function, and partially coherent imaging. A mathematical development will be also be used to illustrate these imaging conditions using a thin object model. We will also analyze phase contrast, dark field, scanning optical microscopy, confocal, nonlinear imaging, Fourier ptychographic imaging and other imaging modalities.

Pre-requisites:

OPTI 505

Number of Units/ component:

1 Unit – Can be distance learning.

Locations and Times:

Friday mornings in room 305. Will be on video for distance students. Preferred as 3rd component modular class.

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:

- Basic understanding of different models used for imaging.
- Physical intuition of how illumination conditions affect the spatial frequency response of an optical system.
- Understanding of different imaging modalities, like phase contrast, dark field, confocal and nonlinear Fourier ptychographic imaging.
- Appreciate applications of these imaging techniques.

Required Texts:

Course notes will be available on D2L.

Topics and/or general calendar:
PRELIMINARY LECTURE SCHEDULE:

1. Background of physical principles;
2. Physical model of the CTF and OTF;
3. Thin-object model of the CTF and OTF;
4. Partially coherent imaging;
5. Köhler, critical and mixed illumination;
6. Dark field and phase contrast imaging;
7. Scanning optical microscopy;
8. Confocal imaging;
9. Nonlinear imaging;
10. Fourier ptychographic imaging;

Number of Exams and Papers:

Course grade is determined from 2 home works and 1 review of a published paper.

Course Policies:

Grading Policy

<table>
<thead>
<tr>
<th>Task</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home works (2)</td>
<td>60% (30% each)</td>
</tr>
<tr>
<td>Paper review</td>
<td>40%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

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._