

EE 5389-001 Nanophotonic Device Engineering

Spring semester 2010 — Topics in Optics

Time: T/Th 12:30-1:50pm

Place: WH 210

Instructor: Robert Magnusson, Professor of Electrical Engineering

E-mail: magnusson@uta.edu

Office location: 544 NH

Office hours: T/Th 3:30-5:00 pm or by appointment

Office phone: 817-272-0690

Course content and student learning outcomes: Understand basics of wave propagation in periodic media in 1D, 2D, and 3D structures. Understand effects of materials including dielectrics, semiconductors, and metals. Learn basics of modeling and analysis in some simple example cases. Learn how to fabricate and characterize periodic devices. Study applications.

Grading policy: Homework: 20%

Research paper: 30%

Midterm exam: 25%

Final exam: 25%

Main topics:

1. Periodic structures
 - Diffraction gratings
 - Diffractive optical elements
 - Photonic crystals
 - Thin films optics
2. Mathematical models
 - Transmittance theory
 - RCWA
 - FDTD
 - Computer codes
3. Fabrication
 - Optical lithography
 - Interference lithography
 - E-beam lithography
 - Nanoimprint lithography
4. Optical properties of materials
 - Insulators
 - Conductors
5. Surface waves and resonance effects
 - Guided-mode resonance
 - Surface-plasmon resonance
6. Applications

Required textbooks and other course materials: None required. Lecture notes and reading materials will be supplied.

Prerequisites: Knowledge of basic electromagnetics and waves; graduate standing.

Descriptions of major assignments and examinations with due dates:

Homework will be assigned on conclusion of each major theme. It is due one week after assignment.

Tentative exam dates:

- Midterm exam: March 9, 2010
- Final exam: Week of May 10, 2010

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

If you require an accommodation based on disability, I would like to meet with you in the privacy of my office, during the first week of the semester, to make sure you are properly accommodated.

Academic Integrity: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. According to the UT System Regents' Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

ANY CHEATING WILL RESULT IN SEVERE PENALTIES.

Student Support Services Available: The University of Texas at Arlington has established a variety of programs to help students meet the challenges of college life. Support to students includes advising, counseling, mentoring, tutoring, supplemental instruction, and writing assistance. For a complete list of academic support services, visit the Academic Assistance resource page of the Office of Student Success Programs, www.uta.edu/uac/studentsuccess/academic-assistance. To help students address personal, academic and career concerns, individual counseling is also available. For more information, students are encouraged to contact Counseling Services www.counseling.uta.edu at (817) 272-3671 or visit a counselor in 216 Davis Hall.

Electronic Communication Policy: The University of Texas at Arlington has adopted the University “MavMail” address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. All students are assigned a MavMail account. Students are responsible for checking their MavMail regularly. Information about activating and using MavMail is available at <http://www.uta.edu/oit/email/>.