

EE 5389-001 Nanophotonic Device Engineering

Spring semester 2013 — Topics in Optics

Time: T/Th 5:30-6:50pm

Place: NH 203

Instructor: Robert Magnusson, Professor of Electrical Engineering

E-mail: magnusson@uta.edu

Office location: 544 NH

Office hours: T/Th 1:30-3:00 pm or by appointment

Office phone: 817-272-0690

Course content and student learning outcomes: Introduction to the fundamentals of nanophotonics and nanoplasmonics. 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. Learn about next generation light-wave circuits: Silicon photonics. Study various other 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. Integrated silicon photonics—selected topics
 7. 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 5, 2013
- Final exam: May 7, 2013

Grading Policy:

Final grade is determined in accordance with scores on assignments as summarized above. The standard academic scale of A, B, C, D, F will be used.

Attendance Policy:

I expect students to attend class.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. 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. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/ses/fao>).

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.

Academic Integrity: At UT Arlington, academic dishonesty is completely unacceptable and will not be tolerated in any form, including (but 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” (UT System Regents’ Rule 50101, §2.2). Suspected violations of academic integrity standards will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:
I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow

students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.