EE 4380 / EE 5380 Principles of Photonics and Optical Engineering

Fall Semester 2018

Monday/Wednesday 4:00–5:20 pm, Room WH 402

Instructor: Michael Vasilyev, Professor, EE Dept.

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Course is open to: all graduate students and fast-track master students (5380-001 section); undergraduate students who have completed EE3407 (4380-001 section).

Textbook: E. Hecht, "Optics," 5th ed., Pearson Education, 2016.

Course Description: The course introduces the basics of optical fields and their applications to lasers, optical fibers, and photonic signal processing, i.e., how light is used in modern systems for encoding, manipulating, transmitting, storing, and retrieving information. It covers light propagation in isotropic and birefringent optical media, behavior at dielectric interfaces, interference, optical cavities and principles of laser action, the basics of optical waveguides (including optical fiber), and electro- and acousto-optic modulation. Emphasis is given to the design and analysis of optical devices, and their applications in communications and signal processing. The course is only offered in the Fall semesters.

This is the gateway course into Photonics area, which also serves as a Technical Proficiency Course and a PhD Diagnostic Exam course for that area. Photonics is not only ***one of the fastest-growing fields of high-tech employment in the USA and around the world***, but also one of the best-funded research areas of the EE Department, with many funded opportunities for both graduate and undergraduate research.

Grading: mid-term exam (50%) and final exam (50%).

For more information, see the instructor's web page: **http://www.uta.edu/faculty/vasilyev**

Pictures below illustrate some of the EE Department's Photonics research projects and facilities. First row: alignment of noiseless optical parametric amplifier; 10 Gb/s NRZ and RZ pulses; UTA-made optical regenerator cleans up a noisy signal; silicon-nitride-based ring microresonators with Q~10^5, fabricated at the UTA. Second row: plasmonic nanoantenna, fabricated at the tip of an optical fiber; UTA's 48×10 Gb/s optical communication testbed; tunable femtosecond laser in Dr. Vasilyev's lab in NanoFAB; nonlinear-optics experimental setup in Dr. Vasilyev's lab in Nedderman Hall.