ECE 8853 Introduction to Nanophotonic Systems

Semester Credit Hours 3

Faculty and Principal Instructor Prof. Abdallah Ougazzaden

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Please note that your principal point of contact for course difficulties, excuses, and grading is your course Principal Instructor. When contacting the course instructors by e-mail, **please include the phrase "**ECE 8853**" on the subject line of the message.**

Textbook **(Required):** Nanophotonics, P.N. Prasad, John Wiley & Sons 2004

Bibliography (recommended)
- Photonic Crystal, J.D. Joannopoulos, Princeton 1995
- Optical and Electronic Process of Nano-matters, Motoichi OHTSU, Kluwer Academic Publisher 2001
- Introduction to Nanoscience G. Hornyak CRC Press 2009
- Fundamentals of Nanotechnoloy G. Hornyak CRC Press 2009

Assessment Homework, Quiz, Projects

Course Objectives: This course covers interactions and materials that constitute nanophotonics, it also introduces the new design of optical nano-components and generation of new way to guide light through nanostructures.

Description

- Introduction
  - Nanoscience and Nanotechnology
  - Optical properties of bulk and nanostructures
  - Light interaction with small structures and objects
- Characterization Methods of Nanomaterials
  - Electron probe characterization methods
  - Scanning probe characterization methods
  - Spectroscopy

- Optical Near –Field Interaction
  - Near-Field Optics
  - Near-Field Microscopy
- Properties of nanostructures: size effect
  - Nanowires, nanodots, nano-particles
  - Applications
- Plasmonics.
  - Metal nanoparticle plasmons
  - Surface plasmon polaritons

- Photonic Crystal
  - Periodic structures and photonic band gap: 1, 2 and 3-Dimensions
  - Nonlinear Photonic Crystals
  - Photonic Crystal Fibers (PCF)
  - Applications: Optical functions, Subwavelength Optical Integration, sensors..
- Fabrication Technology
  - Thin film deposition
  - Clean room fabrication Technology
  - Nanolithography
- Biomaterials and Nanophotonics
  - Bioderived Materials
  - Bioinspired Materials
  - Biotemplates

Grade policy

Your course grade will be determined out of a maximum of **100 percentage points** on the following basis:

- Quizzes: 25%
- Projects: 20%
- Final exam: 40%
- Homeworks: 15%

Above 85%: A

70 – 84%: B

60- 69%: C

59 – 50%: D

Below 50% : F

However, the scale may be adjusted at the principal instructors' discretion depending on the final grade distribution.

Honor Code

Students are expected to act according to the highest ethical standards. The immediate objective of an Honor Code is to prevent any Students from gaining an unfair advantage over other Students through academic misconduct. Academic misconduct is any act that does or could improperly distort student grades or other student academic records. Such acts include but need not be limited to the following:

- Possessing, using or exchanging improperly acquired written or verbal information in the preparation of any essay, laboratory report, examination, or other assignment included in an academic course;
- Substitution for, or unauthorized collaboration with, a Student in the commission of academic requirements;
- Submission of material that is wholly or substantially identical to that created or published by another person or persons, without adequate credit notations indicating authorship (plagiarism);
- False claims of performance or work that has been submitted by the claimant;
- Alteration or insertion of any academic grade or rating so as to obtain unearned academic credit;
- Deliberate falsification of a written or verbal statement of fact to a member of the Faculty so as to obtain unearned academic credit;
- Forgery, alteration or misuse of any Institute document relating to the academic status of the Student.

While these acts constitute assured instances of academic misconduct, other acts of academic misconduct may be defined by the professor.