

## ME 290 Plasmonic Materials

**Prerequisites:** Physics 110A

Instructor in charge: Prof. X. Zhang

Class Time: 4:30-6:00pm M, W. 1165 Etchverry

Office hour: by appt via email: xz\_asst@me.berkeley.edu

### Course Outline:

- Week 1-2: Introduction to plasmonics and metamaterials (notes)  
Light Interactions with Matters: basic theory (Fox book: Ch 1, 2, 7, Maier book Ch 1.2-1.5)
- Week 3-4: Review of Electromagnetism
- Week 4-5: Surface plasmons and wave guide (Ch 2, 7)
- Week 6: Surface Plasmons experiment techniques: excitation/imaging (Ch 3,4)
- Week 7: Surface Plasmons: localized modes (Ch 5)
- Week 8: Surface plasmons: applications (Ch 8-10)
- Week 9: **Mid-term project presentation** (1 week), and report  
(15 min each: 10/5 min talk/questions: 2 sessions)
- Week 10: Metamaterials introduction: Electric and Magnetic Responses (Ch11)
- Week 11: Negative Refraction and Superlens (notes)
- Week 12: Photonic Crystals and non-linear optics; Imaging and spectroscopy: NSOM, SERS (notes)
- Week 13-14: **Final Project presentation** and report due (20 min talk, 10 min question)

**Grading:** midterm presentation (20%) 3-page report (10%), and final project presentation (30%) and final report (40%) (10-page double spaced, Applied Physics Letters style). (The project will be based on a critical review of a topic of plasmonic materials or a small research project). Students will survey the literatures and discuss with instructor about the selection of the topic. Once the topic is identified (week 7), the students are required to extensively in-depth review the topic. Student will need to provide critical comments on the papers, and present their view of what can be done better.