EE535 / EE400: Applied Nanophotonics
Phys 576: Selected topic in experimental physics
Course Instructor: Arka Majumdar (arka@uw.edu)
Course offered: Spring, 2025 (Mon, Wed 12:30-2:20pm); 4 credits

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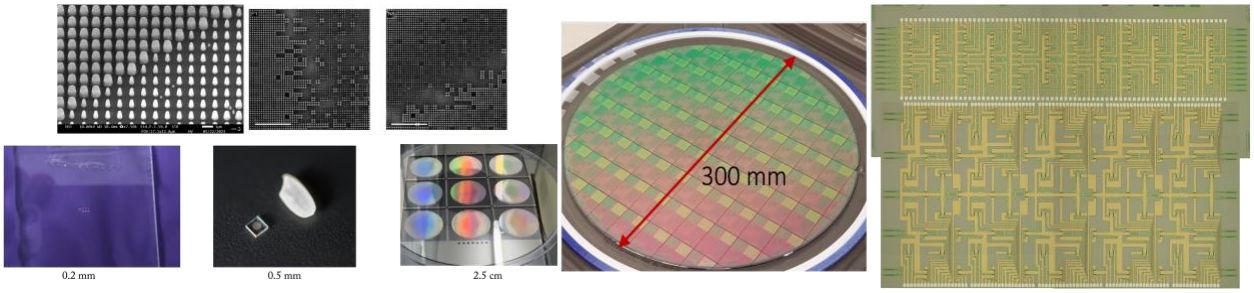
Spanning the entire history of human civilization light has remained one of the most important media for information and knowledge transfer, starting with the lighting of fire to alert people of imminent danger in pre-historic era. Understanding the property and behavior of light is crucial for realms beyond just data and knowledge transfer. It is well-known that high speed internet, novel display, and ubiquitous optical sensors, including cameras rely on photonic technologies. Apart from these, numerous other applications like solar cell, bio- and chemical sensing and medical imaging depend heavily on optics.



Today, we are in a remarkable position to manipulate light in the most innovative manner. We can fabricate optical devices with nano-meter scale features, where the nature of light propagation fundamentally changes. With nanoscale confinement of light, one can even study quantum nature of light in solid-state systems. This opens up advanced avenues of exploration for a variety of applications. These devices enable integrated photonics, novel quantum optics, ultrathin flat optics and new functionalities like negative refraction of light and superlensing. In this course, you will learn about such nanoscale photonic devices, via literature survey, problem solving and numerical simulations using Lumerical FDTD. The course will also include a design project of a nanophotonic device.

Feedback from past years:

- *This course made me realize how important it is to really think about how the application of the physics to a specific technology or device might change and if the application to that technology or device is even feasible.*
- *The examples of practical challenges with designs and experiments. Discussing these topics was extremely interesting, as much of this is not clearly stated in literature. Except for courses like this, similar information is very difficult to find.*

Prerequisite: Familiarity with electromagnetics, quantum mechanics and solid-state devices will be helpful. Programming (either with MATLAB or Python) will be required for the class.