

Fall 2022 Special topic ME 498
Nanoscale Fabrication & Characterization
AKA “There is plenty of room at the bottom”
Open to senior undergraduate and all graduate students

Instructor: **Arend van der Zande**

Lecture: MW, 11 am –12:20 pm,
Location: 101 Transportation Building
ME 498 LI3 - 3 credit lecture, CRN: 58847
ME 498 LI4 - 4 credit lecture & lab, CRN: 61221

Lab Section LA1: Th 12 pm – 2:30 pm, CRN: 58848
Lab Section LA2: F 11 am -1:30 pm, CRN: 60163



Course Description: Nanoscale systems are important to a host of future technologies in energy, information, health, and environment, impacting nearly every aspect of our modern lives. This course will provide a practical understanding of state-of-the-art, nanoscale fabrication and characterization approaches, and the fundamental principles behind these techniques. Lectures will introduce students to topics including top-down and bottom-up paradigms of nanofabrication, characterization of structures smaller than can be resolved with light, the theoretical underpinnings of quantum properties of nanomaterials that these techniques probe and engineer, and applications at the forefront of nanoresearch. The focus will be on two dimensional materials, which will be used as a case study to understand the broader challenges and opportunities of making and using nanoscale systems. There will be two concurrent courses, for 3 credits and 4 credits respectively. The 3 credit option will include lectures, homework, and a final project exploring emerging techniques. The 4 credit option will add lab demonstrations where students will apply course concepts to synthesize monolayer graphene, characterize nanoscale structure and properties, and engineer devices like graphene field effect transistors, as well as postlab assignments learning to analyze and interpret data produced during the labs.

