

Syllabus: NAN 480: Nanotechnology Capstone

Course Title: NAN 480: Nanotechnology Capstone

Semester: Fall 2024

Instructor: Dr. Linda Zhang

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Office Hours: Thursdays 2:00-4:30 PM OR by appointment

Class Time & Place: Monday or Wednesday 3:00-4:15 PM in SANCA 295

Course Description:

This capstone course explores the development of nanoscale devices and materials with applications in various fields such as medicine, electronics, and energy. Students will design, fabricate, and characterize a nanoscale device or material that addresses a specific challenge. The course includes the development of a project proposal, fabrication, testing, and presentation of findings through a report and at the Innovation Showcase.

Course Objectives:

Design and fabricate a nanoscale device or material with real-world applications.

Characterize and test the device's performance using advanced techniques.

Optimize the device or material for improved performance.

Effectively present the project at the Innovation Showcase.

Learning Outcomes:

Gain expertise in nanotechnology design and fabrication.

Develop practical skills in material characterization and testing.

Improve communication skills through written reports and presentations.

Enhance the ability to manage nanotechnology projects from conception to completion.

Group Project and Required Subtasks:

The group project for this course will involve the design and fabrication of a nanoscale device or material with potential applications in medicine, electronics, or energy. The project will be divided into the following subtasks:

1. **Project Proposal (Week 3):**

- Submit a proposal that outlines the nanoscale problem being addressed, the proposed device or material, and a detailed timeline. Assign roles and responsibilities within the group.

2. **Design and Fabrication (Weeks 4-6):**

- Design the nanoscale device or material, including selecting appropriate materials and fabrication techniques. Develop prototypes and test their functionality.

3. **Characterization and Testing (Weeks 7-10):**

- Characterize the nanoscale device or material using advanced techniques such as electron microscopy or spectroscopy. Conduct tests to evaluate its performance.

4. **Optimization and Refinement (Weeks 11-12):**

- Optimize the device or material for improved performance. Refine the fabrication process based on test results.

5. **Final Report and Presentation (Weeks 13-15):**

- Document the entire development process, including design decisions, challenges, and outcomes in a final report.

- Prepare a poster and presentation for the Innovation Showcase that effectively communicates the project's impact.

Groups will need to collaborate closely and meet regularly to ensure progress. Instructor check-ins will be provided to offer guidance and address any issues that arise.

Evaluation:

Class meetings (5): 20 points

Individual meetings (3): 12 points

Project Proposal: 10 points

Design and Fabrication: 15 points

Characterization and Testing: 18 points

Optimization and Refinement: 10 points

Final Report: 10 points

Presentation: 5 points

Poster: 10 points

Total: 100 points

Course Policies:

Attendance and Participation: Regular attendance and active participation are crucial for success in this course. Students are expected to attend all scheduled class meetings and individual sessions. If a student is unable to attend a class, they should inform the instructor in advance and arrange to complete any missed work.

Academic Integrity: All students must adhere to ASU's academic integrity policy. Any form of academic dishonesty, including plagiarism, will be reported and may result in severe penalties, including a failing grade for the course.

Accommodations: Students with disabilities or special needs should contact the ASU Disability Resource Center to arrange appropriate accommodations and notify the instructor as soon as possible.

Important Dates:

Class Week 1: Introductions & Project Brainstorming (Aug 26)

Individual Meeting #1: Discuss Ideas and Readings (Sep 4)

Class Week 2: Proposal Presentation & Group Feedback (Sep 18)

Individual Meeting #2: Proposal Feedback & Methods Discussion (Oct 2)

Class Week 3: Revised Proposal Presentation & CERTT Tour (Oct 23)

Individual Meeting #3: Data Analysis & Progress Review (Nov 13)

Class Week 4: Professional Development & Project Discussion (Nov 27)

Innovation Showcase: Final Presentations & Poster Display (Dec 6)