INSTRUCTOR
Prof. Amanda J. Haes
Office/Office Hours Location: 204 IATL
Office Hours: Mondays, 8:30 – 10 am and 2 – 3:30 pm; or by appointment
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DESCRIPTION OF COURSE
Without nanomaterials, there is no nanotechnology. As such, this course covers the basic principles associated with nanoscience and nanotechnology including the fabrication and synthesis, size dependent properties, characterization, and applications of materials at nanometer length scales with an emphasis on recent technological breakthroughs in the field.

OBJECTIVES AND GOALS OF THE COURSE
Learning objectives for this course will focus on developing a fundamental understanding of the following topics as they relate to nanomaterials.

- **Motivation/Vision:** Feynman’s vision, why use/explore new nanomaterials?
- **Synthesis and Fabrication:** Top down vs. bottom up techniques, nucleation theory, surface energy and stabilization
- **Characterization:** Composition, structure, porosity, crystallinity, single vs. ensemble measurements
- **Examples:** General classification (zero – two dimensional and assembled nanostructures), materials composition/function (metals, metal oxides, semiconductors, carbon, biological)
- **Size Dependent Chemical and Physical Properties:** Electrical, optical, catalytic, magnetic, thermodynamic, why purification is needed
- **Applications:** Electrical, optical, catalytic, magnetic, thermodynamic, purification, sensing, biology, medicine, solar cells, etc. (literature)
- **Implications:** Environment, health, and safety as well as impacts on policy, society, and education

TEXTBOOK AND OTHER RESOURCES
- See Relevant Reading Sections for detailed textbook and supplemental reading. All supplemental reading is posted on ICON for your convenience.
- If warranted, additional resources may be posted on ICON at least 1 week prior to discussion

COURSE WEBSITE
[http://icon.uiowa.edu](http://icon.uiowa.edu) (Access with your username and password – lectures, homework, and up-to-date point totals will be available here. You will be required to submit documents and assignments on this site. Please familiarize yourself with this site.

GRADING SYSTEM AND THE USE OF +/-
Plus or minus grades will be appended to the letter grades assigned for the course. Exceptional performances will receive an A+.

EXAMS, ASSIGNMENTS, AND PERCENTAGE OF FINAL GRADE
Your course grade will be determined from the following elements:

- In class exams (midterm (100 points) and final (150 points)) = 250 points (36 %)
- Homework (2-4 assignments for a total of 150 points) = 150 points (21 %)
- Project (paper and presentation) = 200 points (29 %)
- Class participation = 100 points (14 %)
- Total = 700 points
A NOTE ON COLLABORATION

The homework for this course is designed to help you master your knowledge related to the topics covered during lecture and in the textbook. As such, students may initially discuss their approach to homework assignments with their peers. The work you turn in should be unique meaning additional collaboration is not allowed. Do not share your work with others or ask others to see their completed assignments because both are considered academic misconduct. If you need help, please meet with me. Students are responsible for understanding this policy; if you have questions, ask for clarification.

A WORD ABOUT THE DATE AND TIME OF THE FINAL EXAM

The final examination date and time will be announced by the Registrar generally by the tenth day of classes. I will announce the final examination date and time for this course at the course ICON site once it is known. Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.

COURSE POLICIES

- A 3 hour class typically entails at least 2 hours of outside preparation for the average student for each hour spent in class. You are expected to study an additional 6 hours/week outside of class.
- Attendance on presentation and exam days are required. If you have to miss class on one of these days, please notify me in advance by filling out the form “Explanatory Statement for Absence of Class” and submitting it to me electronically.
- Class participation points can only be earned by attending class. These points can be earned through class activities (think, pair, share and one minute papers, etc.). Roughly 15 point earning activities are planned and you only need to complete 10 of these for full credit.
- Make up exams must be scheduled BEFORE the original exam starts and taken within 48 hours of the originally scheduled exam time. Additional accommodations will be provided if warranted.
- 10 points will be deducted per day for homework assignments and will only be accepted within 48 hours after the due date.
- Re-grade requests will only be considered within 5 business days following their return. Only electronic or assignments completed in pen will be considered and must be accompanied by a written description of your request.
- Projects (presentations and papers) must be original work. In other words, your project cannot be used to satisfy requirements in another course (past, present, or future). These assignments will be checked for plagiarism.
- Please silence all cell phones during class.
- Refrain from using electronic devices for non-course related purposes during class.

RESOURCES FOR STUDENTS

You may find the Writing Center (http://www.uiowa.edu/~writingc/) and the Speaking Center (http://clas.uiowa.edu/rhetoric/for-students/speaking-center) very useful for this course; the Tutor Iowa site (http://tutor.uiowa.edu/) is also very valuable for students seeking extra help.

CALENDAR OF COURSE ASSIGNMENTS AND EXAMS

Important Course Deadlines (Due at 10:30 am on the deadline date unless otherwise noted)

- October 16…….Presentation Topic Selection
- September 30……Mid-Term Exam (through material covered through September 30th)
- November 12……Paper
- ~11/30-12/13……Presentations (your presentation slides must be posted in the drop on ICON by 9 AM on the day of your presentation)
- Unannounced……Participation
- TBD…………….Homework assignments (will be made available at least two weeks in advance)
- TBD…………….Final Exam (Two-thirds of the final will focus on material covered after the midterm exam – including your presentations, one-third of the material will be cumulative)
Course Topics and Relevant Reading (presented in the following order).

Text book chapters are considered required reading. Unless noted, reading of all other material is optional but has been used to assemble lecture material.

Thanks to the University of Iowa’s excellent electronic book collection and/or Google Books in the area of nanoscience and nanotechnology, all supplementary reading material is available to you for no additional cost. See ICON for details.

Additional material may be added throughout the semester.

1. Motivation & Vision (Lecture Pack 1)
   a. “There’s Plenty of Room at the Bottom: An Invitation to Enter a New Field of Physics,” Richard P. Feynman (required reading)

2. Synthesis, Fabrication, & Surface Energy (Lecture Pack 2)
   a. Chapters 1, 2, 3, 7

3. Characterization (Lecture Pack 3)
   a. Chapter 8

4. Nanomaterial Examples (Lecture Pack 4) (0, 1, 2, etc. dimensional material classification)
   a. Chapters 3, 4, 5, 6

5. Size-Dependent Chemical & Physical Properties (Lecture Pack 5)
   a. Chapters 8.4-8.5, 9

6. Implications, Ethics, & Safety of Nanomaterials (Lecture Pack 6)

7. Applications of Nanomaterials (Your Presentation Slides 7)
   a. Chapter 9
   b. Your presentations (these will be posted on ICON)
ADMINISTRATIVE HOME
The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at http://clas.uiowa.edu/students/handbook.

ELECTRONIC COMMUNICATION
University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences (Operations Manual, III.15.2, k.11).

ACCOMMODATIONS FOR DISABILITIES
A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

ACADEMIC HONESTY
All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS FINAL EXAMINATION POLICIES
The final examination schedule for each class is announced by the Registrar generally by the tenth day of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

MAKING A SUGGESTION OR A COMPLAINT
Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

UNDERSTANDING SEXUAL HARASSMENT
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

REACTING SAFELY TO SEVERE WEATHER
In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.

These CLAS policy and procedural statements have been summarized from the web pages of the College of Liberal Arts and Sciences and The University of Iowa Operations Manual.