

Nanotechnology: Content and Context (Chemistry 235/Anthropology 235)

Instructors: Christopher Kelty and Kristen Kulinowski

Guest Instructors: David Caprette, Vicki Colvin, Hannah Landecker, Kevin Kelly, Anne Papakonstantinou, Matteo Pasquali, and Robert Raphael

TA: Eric Baum

Website: <http://kelty.rice.edu/235/> (Check here for all updates and readings!)

Meeting Time: T/TR 9:25 to 10:50

Place: Baker 102

Offices and Office Hours:

Kulinowski: Butcher Hall 146 (tbd, by appt)

Kelty: Sewall Hall 580 Tues 11-12:30 or by appt.

Baum: (tbd, by appt.)

Overview

Prerequisites: None.

The goal of "Nanotechnology: Context and Content" is to teach you some basic nanoscience/nanotechnology by putting it in a social and cultural context. Students are expected to learn both some basic science and technology and at the same time, some techniques for understanding the social and cultural significance, role, and possible effects of this emerging science. Students from from all majors are encouraged to take this class. In addition, students are expected to assist each other in learning and discussing the content and the context, and to maintain respect for both the scientific and the social and cultural approaches.

The class is designed for, but not necessarily restricted to, freshlings and sophmores.

Two main instructors (Drs. Kelty and Kulinowski) will coordinate the class, and 6 other instructors have been invited to teach in particular weeks. This means students should be prepared for a bit of a roller-coaster ride of different topics and questions, but with the underlying goal of teaching science and technology by looking at it in context. Be prepared to learn diverse things from people with different teaching styles. This also means that attendance is mandatory, since there will be no way to "make up" the lectures given by our guests.

You can receive either Group II or Group III distribution credit from this course (but not both!). For Group II Credit, sign up for Anth 235; for Group III credit, sign up for Chem 235.

Just in case it is not obvious: *you need to complete ALL of the work in the class to receive credit for the course.*

Labs

There will be occasional labs, conducted during class time. You are required to attend these labs.

Study Sessions

Study sessions are optional and will be organized on an ad hoc basis as needed.

Readings and other Resources

Required Books:

Required Books are either available at the Campus Bookstore, or from your favorite book retailer.

Nanotechnology: A Gentle Introduction to the Next Big Idea by Ratner and Ratner.

Prey by Michael Crichton

Other Required Readings:

All other required readings will be listed on the website. These readings are either available online, or made available through Electronic Course reserves at Rice University.

Grading

Quizzes and writing assignments: 40%

Because there are multiple instructors in the course, there will also be multiple forms of testing and writing. For most of the "content" weeks, these will take-home quizzes on the material covered; for the "context" weeks, they will be writing assignments of some kind. All students are expected to take (and hopefully pass!) all of the assignments.

Attendance and Participation in Discussion: 20%

All students are expected to attend all classes, and demonstrate engagement with the material through discussion, questions and interaction with each other and with the invited lecturers. Drs. Kelty and Kulinowski will assess student participation case by case.

Glossary: 20%

Each Tuesday, students will hand in a "glossary entry" which explains the significance of some concept or term from the previous week.

Semester-end Role Playing Exercise: 20%

An end of semester mock debate, in which students are expected to learn specific roles and play them out in class.

Honor Code and Plagiarism

Quizzes and Writing Assignments are expected to be the student's own work. We will make clear before each one, whether it is timed, open/closed book, or involves other restrictions.

Glossary entries must clearly indicate sources, when used, using proper citation (if you don't know, ask!). Glossary entries are expected to be the student's own original work.

The Role Playing assignment will involve students working together in groups. Any written components may be done collaboratively, but again, all referenced sources must be properly cited.

Student Assessment of Learning Gains

The student assessment of Learning Gains is a survey. It is required of all students, but will have no effect on your grade or standing in the class.

All students must fill out the pre-course survey, which can be found here:

<http://www.wcer.wisc.edu/salgains/stu/default.asp>

Course ID: 110

Course Password: rice235

Student ID:

Student ID is your Rice username. So if your email address is hello@rice.edu, then your username is hello.

The data you enter will only be used by Rice faculty in the aggregate. Individual responses will not be matched to student identities. Please be honest in your assessments of yourself and the course.

Course Schedule

(Note: *This schedule is tentative Check <http://kelty.rice.edu/235/syllabus.html> for latest schedule*)

Date	Topic	Instructor	Reading/assignments (to be completed by this date)	Additional info
Aug. 24	Introduction	Kulinowski/Kelty	Purchase a copy of <i>Prey</i>	Fill out SALG Survey here...
Aug.	Lecture: Intro to	Kulinowski	Begin reading <i>Prey</i> by	

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26	Nanoscience and Nanotechnology		Michael Crichton; "Nanotech Facts" from the National Nanotechnology Initiative; Feynman "There's Plenty of Room at the Bottom"	
Aug. 31	Discussion: Futures Bright and Dark	Kulinowski/Kelty	<i>Prey</i> ; Assignment #1: Book Review (due in class)	
Sept. 2	The Multiple Futures of Nanotechnology	Kelty	Readings: 1) Rick Smalley, "Our Energy Future"; multiple versions available on the Smalley Group website http://smalley.rice.edu/ 2) K Erik Drexler "An overview of nanotechnology and molecular manufacturing" at Drexler's website Molecular Engineering 3) Selected Grant Proposals from Rice Faculty members.	Additional resources: Organizations: National Nanotechnology Initiative http://www.nano.gov/ Foresight Institute http://www.foresight.org/ ETC Group http://www.etcgroup.org/ ("The Big Down" is ETC's report on Nanotechnology The Center for Responsible Nanotechnology http://www.crnano.org/index.html Corporations: CNI Carbon Nanotechnologies Inc. C60 Nanospectra biosciences Zyvex
Sept. 7	The Scientific Method	David Caprette	Please read and prepare this handout for class.	
Sept. 9	Mathematical Meanings of Scale and Measurement	Anne Papakonstantinou	Before class, please preview one of the following two web sites which provide visual journeys of the powers of ten. Powers of 10 applet A Question of Scale Today's class will focus on the mathematical concepts of scale and measurement. Subsequent class meetings will make the connections to nanotechnology.	A video copy of the classic film "Powers of Ten" by Charles and Ray Eames is available for interested students (see Prof. Kelty).

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Sept . 14	The Public Understanding of Science	Kelty	Readings: 1) The Golem 2) The Golem at Large both available from Electronic Course Reserves (ECR)	
Sept . 16	Debating Science in Public	Kelty	Readings: 1) The Social Drama of Recombinant DNA (ECR) 2) Drexler and Smalley Debate Molecular Manufacturing in Chemical and Engineering News Dec. 1, 2003; 3) Drexler, "Feynman to Funding" <i>Bulletin of Science, Technology and Society</i> 24(21) 2004 (via SAGE Publications)	What was Asilomar? If you don't know, you need to find out...
Sept . 21	The History of Microscopy	Kelty	Readings: 1) Robert Hooke, "Of the Schematisme of Texture of Cork..."(ECR) 2) Antony van Leeuwenhoek, "Observations . . . Concerning Little Animals,"(ECR)	
Sept . 23	Visualization: Image and Logic	Kelty	Readings: <i>Image and Logic</i> by Peter Galison pgs 19-31 (ECR)	
Sept . 28	Nanomanufacturing	Matteo Pasquali	Readings: (See Readings section...)	Additional Readings: (See Readings section...)
Sept . 30	Nanomanufacturing cont'd	Matteo Pasquali	Readings: (See Readings section...)	
Oct. 5	Nanomachines, Nanowires and Self-Assembly	Kevin Kelly		
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Oct. 12	FALL RECESS: NO CLASS			

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Oct. 14	Money, Intellectual Property and Funding	Kulinowski/Kelty		
Oct. 19	Characterization with Microscopy	Kevin Kelly		
Oct. 21	Characterization with Microscopy	Kevin Kelly		
Oct. 26	Parallels with Biotechnology	Hannah Landecker	Readings:	
Oct. 28	Parallels with Biotechnology cont'd	Hannah Landecker		
Nov. . 2	Biomotors and Nanomedicine	Robert Raphael		
Nov. . 4	Biomotors and Nanomedicine	Robert Raphael		
Nov. . 9	Body and Machine	Robert Raphael		
Nov. . 11	Posthumanism	Robert Raphael		
Nov. . 16	Nanotechnology and The Environment	Vicki Colvin and Kristen Kulinowski		
Nov. . 18	Nanotechnology and The Environment	Vicki Colvin and Kristen Kulinowski		
Nov. . 23	Ethics and Politics of Nanotech: Interviews with Scientists	Kelty		
Nov. . 25	THANKSGIVING: NO CLASS			
Nov. . 30	Role Playing Exercise			
Dec. . 2	Last Day of class			

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