

Contemporary Physical Sciences

Welcome!

Uranium! Perhaps no other element is so intertwined with our hopes and fears, our dreams and nightmares, perhaps even with the fate of our planet. This course will weave three stories together: the "Radium Girls", the "Firecracker Boys", and the Navajo uranium miners in the Southwest. The first relates to the women who painted radioactive glow-in-the-dark watch dials as part of the first nuclear industry in our country. The second relates to the physicists who proposed to use thermonuclear weapons to blast a harbor in northern Alaska, perhaps even in the shape of a polar bear. And the third tells of the miners and their families who were poisoned by the yellow uranium dust. By illustrating different aspects of uranium, each story shows the complex interactions between science, society and culture. Each story also gives us the opportunity to explore issues that we continue to face today.

You will find that ILS 251 requires a team effort. You are part of this team. We need your steady participation over the course of the semester, your collaboration with others, and your input about what best can help you to learn.

Goals for this ILS course

Yes, we want you to learn scientific content. In fact, we hope you will achieve a mastery of topics relating to radioactivity so that you can read and evaluate newspaper articles, make your own arguments, and discuss the issues involved with friends, family and future colleagues. This mastery includes:

- Knowing how radioactive substances behave.
- Knowing where radioactive substances are (and are not) found in our world. This includes knowing which ones occur naturally, are continuously produced naturally, and/or have been produced by humans.
- Given any radioisotope, being able to assess its potential health consequences. This assessment would be based on factors such as the amount of the substance, its chemical form, its physical form, its half-life, the type of radiation it emits, its route of uptake (or not) into the body, and its rate of excretion.
- Having a working knowledge of the biological effects of radiation, nuclear fission, the nuclear fuel cycle (or lack thereof), nuclear fusion, nuclear weapons and the history of their testing since World War II.

But please think beyond "covering content." The course content is really secondary to a set of higher order goals. These include your ability to:

- Integrate cultural and scientific issues.
- Formulate questions about complex topics that interconnect people and science.
- Handle complex ideas that do not have a single or best solution to all concerned.
- Communicate technical scientific ideas to the general public, both in essay form and by drawing up "talking points."
- Learn something in one context and apply to another.
- Engage others in a topic that is of interest to you.

- Review another person's work and offer helpful feedback.
- Review your own work, consider the feedback of others, and make appropriate changes.

To the greatest extent possible, please challenge yourself with these higher order goals.

Required Course Materials

1. Deadly Glow
The Radium Dial Painters Tragedy
Ross Mullner
American Public Health Association
1999
2. Nuclear Chemistry
Cathy Middlecamp
2003 (Will be handed out the first day of class)
3. The Firecracker Boys
Dan O'Neill
St. Martin's Press
1994 (this is out of print, and with permission of the author we have a reprint)

ILS 251 - Contemporary Physical Sciences - Spring 2006

Please consider this to be a "living" document that will be modified. Why? Because this course will be responsive to your interests and to the questions you ask. Thus, we will fine tune the study questions for the content areas below as the course progresses. Here are the big areas we will investigate. Click on the links to view the associated study topics. Our pathway through these topics will not be linear. For example, at the outset we will begin with both nuclear radiation and the radium girls, delve into the effects of radiation, go back to the radium girls, learn more about nuclear radiation, revisit the radium girls ... and so forth.

[Nuclear Radiation](#)

[The Radium Girls](#)

[Biological Effects of Ionizing Radiation](#)

[Nuclear Fission](#)

[The Firecracker Boys](#)

[The Nuclear Fuel Cycle](#)

[The Dine \(Navajo\) Uranium Miners](#)

[The Atom Bomb and Its Testing](#)

[The Hydrogen Bomb and Nuclear Fusion](#)

As you read through these areas for study and the associated study questions, you will notice that very few of the questions are "low level." This is deliberate. For example, in "Nuclear Radiation" listed above, you will not find a list of questions such as "Write the nuclear equation for the alpha decay of radon" or "Define the term half-life." Rather, "Nuclear Radiation" includes higher level questions such as: "What substances occur

naturally that make our planet radioactive? Why do these occur? How do you decide whether or not these present hazards?" This question is accompanied by another that points to the bigger issues: "Because of human activity, more radioactive substances now are present on our the planet. Why have we created them? Which are harmful, which are helpful, and which are some of both ...?" Questions such as these presume command of facts and require the ability to apply them to new situations.

The same is true for the information that relates to people and societal issues. For example, in the second area listed above, "The Radium Girls" you will not find a question that asks who the radium girls were and what happened to them. Rather, look for higher level questions such as "When hazardous working conditions occur, occupational safety involves three issues: (1) Determining who was affected, (2) Compensating the victims, and (3) Protecting future workers. Comment on the outcomes for each of these, relevant to the radium dial painters." Again, look for bigger picture questions such as "Occupational health and safety is still an issue today for workers. Give examples and provide commentary."

Generally speaking, though, we will progress through these three topics in order: The Radium Girls (text: The Deadly Glow), The Firecracker Boys (text: The Firecracker Boys), and the Navajo Uranium Miners (text: If You Poison Us). Each of these interweaves people and science. The final part of the course will be devoted to class presentations of topics that you research that interweave people and nuclear science. Bottom line: The topics in this course are complex. While you will need to bring yourself up to speed on nuclear chemistry, physics, and geology, ultimately the issues that you will explore have no simple answers. You cannot find the solution in the back of any textbook. Perfect for an ILS course, yes ...?

Grading in ILS 251

Do you know the university policy on academic honesty? If not, visit the site from the [Dean of Students](#). It is your responsibility to follow university policies. Student dishonesty is troublesome for your classmates, your instructor, and for you. It is in everybody's best interests that you work with integrity.

Almost every semester, one of my students has plagiarized part or all of a writing assignment. In most cases, the student has been stressed and short of time, rushing to turn something in. If you are stressed, talk to us! We may be able to find an option that relieves some of your stress. See [Plagiarism And How To Avoid It](#) for helpful information.

Another suggestion. The document [What is Plagiarism?](#) by Scot Van Bramer is helpful and to the point. Please check it out!

Quizzes will be held roughly every other week. Check the calendar for the dates, and look for the sample quiz questions posted for you. There will be 7 quizzes given over the course of the semester and each one will be worth 50 points. You may drop your lowest quiz score.

NOTE: There are no scheduled alternative times (early or late) for quizzes. If you miss one, this will be the quiz that you drop. In the event that you must miss a quiz because you are part of a university-sponsored event, we will arrange an early quiz for you. If you

have a family or medical emergency (such as a death in the family or your being sent to the hospital because of an illness or injury) in which you must unexpectedly miss a quiz, you may make it up at the start of the class that follows.

Your attendance and participation in class are important. Accordingly, both count toward your grade in the course. It is your responsibility to let us know before the class period why you need to be absent. A detailed message via email (chmiddle@wisc.edu) or phone (263-5647) any time before noon of the class day is fine. You may miss one class without a prior excuse. After this, 15 points will be deducted from your point total for each class you miss. The instructor reserves the right to prorate the 15 points (say for example to 10 if you show up an hour late).

This course has three small projects and one larger one. [Project #1](#) and [Project #3](#) relate to the radium girls. [Project #2](#) relates to your writing conference.

The large class project involves a class presentation, preparing a handout, assembling a set of study questions, and doing a self-assessment. In addition, you will receive feedback from your peers. Check the [details](#).

Please check your grades in [Learn@UW](#).

A point system is used to assign grades. Remember that unexcused absences (or coming late to class) will decrease your point total.

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|-------------------------------|------------|------------------------|
| In-class quizzes (6 out of 7) | 300 points | (50 points each) |
| Shorter class projects | 150 points | (30, 50 and 70 points) |
| Large class project | 400 points | |
| Miscellaneous | 50 points | |
| TOTAL | 900 points | |

Grades are not assigned on a curve, thus you are not competing with your classmates for a grade. The instructors reserve the right to adjust the grading scale to match any changes we make in course activities (and to correct any math errors in the scale).

| | |
|----|------------------|
| A | 830 – 900 points |
| AB | 810 – 829 points |
| B | 740 – 809 points |
| BC | 720 – 739 points |
| C | 650 – 719 points |
| D | 590 – 649 points |
| F | below 590 points |

If you do the math, you will see that this point system is not set up on the basis that 90% and above is an A, 80% and above is a B, etc. The curve is more rigorous than this. Why? Because we want you to learn more than 80% of the material in order to earn a B. You

will find that some of the points are quite easy to get. For example, if you work steadily throughout the semester and attend regularly, you will do well. Remember that you can drop your lowest quiz grade.

Please recognize that these point allocations are estimates. If for some reason something extra is added or something does not take place, the scale will be adjusted appropriately.

Teaching Staff

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