

Chemistry 201

Uranium & American Indians

Welcome!

This course will explore the connections between uranium and the peoples of the Southwest who live on the land where the uranium was extracted. Topics in nuclear chemistry will include radioactivity, nuclear decay series, nuclear fission, half-lives, the nuclear fuel cycle, radon, and the effects of radiation on health. Topics about the Navajo people will include the history, culture, land issues, politics, spirituality, and tribal government development. All information will be presented against the backdrop of the Navajo people who mined the uranium, unaware of its consequences. The changes that the Navajo people experienced will be explored in the face of the deadly elements (leétso) that dropped into their culture.

Chemistry 201

Topic: Uranium and American Indians
Semester: Spring 2004
Credits: 3 (course meets Ethnic Studies Requirement)
Meets: TR 4:00-5:15 pm
Instructors: Omie Baldwin and Cathy Middlecamp

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Textbooks and Readings:

1. Memories Come To Us In the Rain and the Wind, Oral Histories and Photographs of Navajo Uranium Miners & Their Families, Red Sun Press, Jamaica Plain, MA 2000.

2. *If You Poison Us: Uranium and Native Americans*, Peter H. Eichstaedt, Red Crane Books, 1994.
3. *Diné: A History of the Navajos*, Peter Iverson, University of New Mexico Press, 2002. (selected parts)
4. “Nuclear Chemistry”, Catherine Middlecamp, (c) Houghton-Mifflin, for publication in 2004..

Weeks 1-6

The class will open with a showing of “The Return of Navajo Boy”. This documentary quickly immerses the viewer in the Navajo language and culture, telling the story of a Navajo boy who was reunited with his family as a man, having years earlier been adopted by white missionaries. The film also portrays the trauma that the boy’s family endured because members worked in the uranium mines.

Following the film, the first four weeks of the course will tell two stories. Cathy will describe the chemistry of uranium and its radioactive decay products. Classroom presentations will illustrate where and how uranium is found on the planet, its radioactive properties, its chemical behavior, radon and radium (two notorious decay products), detection and units of radioactivity, half-lives of radioisotopes, the mining and milling of uranium, the nuclear fuel cycle, the waste from the uranium mining process, and, of course, the process of nuclear fission which was one of the reasons why uranium was mined, purified and enriched in the first place.

Simultaneously, Omie will offer classroom presentations will begin exploring the landscape and peoples of the Four Corners region. The book *Diné: A History of the Navajos* begins, “They are the children of Changing Woman. They are called the Navajos. They call themselves Diné.” Omie will guide you through topics relating to the Diné, focusing on their history and culture, the Indian policies including reservation development (the Dawes Act and the Allotment Act), the policies of the Bureau of Indian Affairs (BIA), the mining development, the Radiation Exposure Compensation Act (RECA), and the social impact of mining, including how it affected their health, their lifestyle and their communities.

During this time, we will read:

1. *Memories Come To Us In the Rain and the Wind, Oral Histories and Photographs of Navajo Uranium Miners & Their Families*, Red Sun Press, Jamaica Plain, MA 2000.
2. *If You Poison Us: Uranium and Native Americans*, Peter H. Eichstaedt, Red Crane Books, 1994.

Weeks 7-9

Starting in week six, we will have a mixture of class discussions and guest speakers.

To date, scheduled are:

- Tuesday, March 2: Bruce Thomadsen, UW Medical Physics
“The Biological Effects of Ionizing Radiation”
- Thursday, March 4: Doug Brugge, Tufts School of Medicine
“Uranium mining, the Navajo People and Federal Compensation: Lessons in Fairness”
- Other speakers that we hope to include:
Milton Bluehouse, Jr. “Navajo Tribal Government”
Timothy Hugh-Benally, Navajo Community College Health Professional, “The Effects of Lung Cancer”

Weeks 10-15

During these final weeks, students will give presentations on topics that combine chemistry and indigenous culture. Each class period, two students will present, leaving time for discussion. Students also will provide a list of questions to guide study and discussion of the issues. This presentation will be accompanied by a 4-5 page paper (not including citations and figures).

We ask that the first day of these presentations be on the topic of indigenous people, answering questions such as: What is an indigenous person? Who are the indigenous people in the U.S.? What issues face indigenous people, especially in the U.S., but as time permits, with a world-wide perspective. We are asking for two volunteers to split this first topic in any manner they wish.

These presentations are expected to explore in more depth the issues raised in *If You Poison Us* and *The Dine*, as well as to raise new issues. Examples of topics from the previous year of the course include:

- Yucca Mountain: storage of nuclear waste on or near tribal lands
- Depleted Uranium (DU) and where the military tests/deploys it
- The Radiation Exposure Compensation Act & the Navajo people
- Phytoremediation of tribal lands

- The after-effects of nuclear weapons testing on the Marshall Islands
- Weapons testing & tribal lands in the U.S.
- Spirituality and the land.
- The Kerr McGee Corporation and the uranium miners

The UW Ethnic Studies Requirement

As part of the general education requirements at the UW, students are required to take an “e” course that “considers ethnic/racial minorities that have been marginalized or discriminated against in the U.S.” More information about general education and the important role of “e” courses is available at <http://www.ls.wisc.edu/gened/>

Chemistry 201 fulfills the ethnic studies requirement.

We reprint for you below the introduction to our text, *If You Poison Us*. Please return to these paragraphs throughout the semester, rereading them as your understanding of the issues grows. Each time, we hope you will come to the words with a new and deeper perspective.

"In the Navajo perspective of the world and the universe, man is just a small part of a much larger whole, a system in which everything exists in balance: the earth, the sky, the spirits, and all living creatures. To maintain and preserve this harmony is to walk in beauty. When people, plants or animals get sick, it is usually because the harmony has been disturbed. Navajo medicine men perform healing ceremonies to restore harmony so that a patient can once again walk in beauty.

However, there are no healing ceremonies that can restore the harmony that has been disturbed on Indian lands in the Southwest. No Navajo ceremonies and none of the white man’s medicine can restore life to the men who died mining and milling uranium.

Today Native Americans continue to reap a bitter harvest for their patriotic role in World War II and the Cold War. Undetermined tons of exposed radioactive mine waste remain on native lands. Rainwater has leached uranium by-products and toxic metals into underground water, with potentially long-lasting consequences. Small uranium pit mines remain open, filled with water, inviting children to swim and animals to drink. At Laguna Pueblo, an open-pit mine that covers nearly 3,000 acres remained untouched for seven years after operations stopped, until the pueblo itself started reclamation.

This book is the story of how uranium mining began on Indian lands in the American West, how it was conducted, and how its deadly legacy still lingers in the lives of the men, women, and children whose harmony and homelands have been destroyed."

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A note about chemistry prerequisites

This course carries a prerequisite of one of the following courses: Chem 104, Chem 108, Chem 109 or Chem 115. We assume that you are already familiar with these topics, and will review them briefly during the first three weeks of the course.

- The nucleus, mass number, atomic number, isotopes
- Types of Radioactive Decay
 - Naturally occurring radioactive decay series
- Interaction of Radiation with Matter
- Mathematics of Radioactive Decay

Topics covered in depth include:

- Uranium: natural occurrence, isotopes
- Uranium ores and the radioactive decay series
- The uranium mining and milling process
- Environmental cleanup and remediation of mines and mills
- Nuclear Waste
- Toxicity of Uranium
- Splitting the Atom: Nuclear Fission
- Exposure to radiation on Earth
- The Uranium Fuel Cycle
- The Radium Dial Painters
- Radiation as a carcinogen
- Radon and Lung Cancer

Grading

Class participation (10%) 6 self-assessments, drop 1 20 points each	100
Class attendance (10%)	100
Quizzes (30%)	300

7 quizzes, drop 1
50 points each
(25 points chemistry, 25 points Navajo culture)

Presentation	
Handout (5%)	50
Quiz questions (5%)	50
Peer review (15%)	150
Self assessment (5%)	50
Paper (10%)	100
Revised paper (10%)	100
TOTAL	1,000

Tentatively, grades will be assigned on the following scale:

910-1000	A
890-909	AB
810-889	B
790-809	BC
700-789	C
650-699	D

Attendance

You may miss one class this semester, and others if necessary if you have a medical excuse or a family emergency. For example, if you were just diagnosed with strep throat (and haven't taken 24 hours of antibiotics) or have influenza (the real thing, not a respiratory infection) we strongly suggest that you stay home and we will excuse you.

After one un-excused absence, each missed class is minus 10 points.

Chemistry 201- Presentations

During the last 10 weeks of the course, students will give presentations on topics that combine chemistry and indigenous culture. Each class period, two students will present, leaving time for discussion. Students also will provide a list of questions to guide study and discussion of the issues. This presentation will be accompanied by a 4-5 page paper (not including citations and figures).

We ask that the first day of these presentations be on the topic of indigenous people, answering questions such as: What is an indigenous person? Who are the indigenous

people in the U.S.? What issues face indigenous people, especially in the U.S., but as time permits, with a world-wide perspective. We are asking for two volunteers to split this first topic in any manner they wish.

These presentations are expected to explore in more depth the issues raised in *If You Poison Us* and *The Dine*, as well as to raise new issues. Examples of topics from the previous year of the course include:

- Yucca Mountain: storage of nuclear waste on or near tribal lands
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- Spirituality and the land.
- The Kerr McGee Corporation and the uranium miners

Your handout for the class and quiz questions are due at the same time that you give your presentation.

Your paper is due the Thursday before spring break (March 11). There is some wiggle room here, as long as everybody doesn't need wiggle room. We will carefully read your papers and offer feedback on content, style and grammar. The revision of your paper is due on Thursday, April 22. Again, we have a small amount of wiggle room to accommodate your needs.

Sample [Powerpoint slides](#) from presentations in 2003

[Self-Evaluation Form](#) for presentation

Chemistry 201

Spring 2004

Self Evaluation of your Class Presentation

Self evaluation is a valuable educational tool, as it facilitates your participation in the final analysis of your educational experience. Here we list some points to help you write your evaluation.

- **Goals**
What did you want to learn? What information did you want to convey? What goals did you meet? What did you do to achieve these goals? What worked for you? What did not work? What would you have done differently if you had had more time, more information, etc.?
- **Value**

1 2 3 4 5 6 7 8 9 10

TOTAL POINTS Delivery ____ + Content _____ = _____

Grading criteria for your paper

[First draft of your paper](#) (100 points)

95 – 100 points	The paper is well-organized at the paragraph level. The content is accurate, sufficient and catches the reader’s interest. The paper doesn’t appear to have been done at the last minute. The sentences are reasonably smooth and not too wordy. There are no errors in usage, such as in its/it’s and effect/affect. There are no spelling errors.
85 – 94 points	The paper need some work at the paragraph level. The content needs some “tweaking,” either in amount, content or method of presentation. The paper shows perhaps a hint of having been done too quickly. Some sentences are in need of fine-tuning. There are only a few usage or spelling glitches.
75 – 84 points	The paper needs moderate work at the paragraph level. The content needs quite a bit of attention in terms of level, accuracy, method of presentation. The paper shows signs of having been done too quickly. There are 4+ spelling or usage errors (these distract the reader).
65 – 74 points	The paper needs substantial work at the paragraph level. The content has glitches and/or omissions. If effort was put in, this is not very apparent. There are numerous word errors (these distract the reader).
<64 points	The paper is poorly organized. Some parts may be so confused that their meaning is not clear. Words may imprecise, inappropriate, incorrect or vague. These errors distract the reader. The content contains errors. The content is inadequate.

[Things to work on as you revise your paper](#) (checklist)

Things that you need to work on as you revise your work.

	First paragraph needs work
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	<p>Too short Too long or too wordy Needs to do a better job of helping the reader understand what is to come Doesn't relate well to what follows Needs to do a better job of catching the reader's attention</p>
	<p>Quoting sources Check for places that you should have cited the source of your info Check for places that you should have used quotation marks Web sites – include title of page and date accessed Web sites – include the correct URL Not enough sources provided Other:</p>
	<p>Reader friendliness Uses technical language that reader may not understand Other</p>
	<p>Common word errors (check and fix throughout the document) It's and its Affect and effect Incorrect use of apostrophes Spelling and typos Other:</p>
	<p>Common punctuation errors (check and fix throughout the document) Too many commas Incorrect use of commas Not enough commas Unusual use of colon and/or semicolon Other:</p>
	<p>Figures and visuals A figure or two would really help</p>
	<p>Concluding paragraph Doesn't summarize or bring things together well</p>

Final draft of your paper (100 points)

90-100 points	The paper is well-organized at the paragraph level. Sentences are smooth and carefully crafted. There are virtually no errors in punctuation, spelling, grammar or usage. Words are chosen with precision. The paper sounds like it was written by a human being for another human being. The paper is tight, not wordy. The content is first-rate in all regards.
80-89 points	The paper is well-organized, but the paragraph structure is sometimes disjointed or unclear. The paper may have a few awkward passages and some errors in punctuation, spelling, grammar or usage. At times, the language may be too general and it may lack the precision of a better paper. None of these concerns, however, is glaring or highly distracting. The content is correct, but perhaps not complete or relevant.
70-79 points	The paper is basically well-organized, though some paragraphs may be disunified or misplaced. Generally though, the paper shows that the writer has followed a logical plan. The writing is competent but wordy general or imprecise. Sentences may sometimes be constructed awkwardly, but their meaning is clear. Grammar, punctuation and spelling are not highly distracting, but there may be some errors. The content may be inadequate or contain errors.
<69 points	The paper is poorly organized. Some parts may be so confused that their meaning is not clear. Words may imprecise, inappropriate, incorrect or vague. These errors distract the reader. The content has errors and is inadequate.