

Time & Location

Jan 18 – March 6	Mon/Wed, 8:30 – 9:45 AM	MSM 112
March 8 – May 8	Wednesday, 8:30 – 11:00 AM	MSM 173

Grading

Homework (20%): assigned at the end of each topic.

Exam (60 %): oral presentations (~20 min, based on a literature article chosen by the students on actinide chemistry)

Participation (20 %)

Textbook

The Chemistry of the Actinide and Transactinide Element, Editors, Morss, L.R., Edelstein, N.M., and Fuger, J., 3rd edition, Springer, Dordrecht, Netherlands, 2006

note: The website springerlink.com is used for links to book chapters and articles on the actinides. It operates when the page is searched from UNLV.

The cumulative outcomes for course are:

- Understand the role of oxidation-reduction reactions in actinides
- Evaluation and utilizing actinide speciation and complexation
- Understanding the impact of f-orbitals on actinide chemistry
- Ability to interpret spectroscopy of the actinides
- Ability to discuss in detail the chemistry of various actinide elements
- Explain how to use actinide nuclear properties in experiments
- Ability to work with radioelement in solution and in the solid-state
- Ability to perform liquid-liquid extraction and synthesis of Uranium compounds

The goal of the course is to provide students with an understanding of the actinide elements for support in graduate education and research.

The chemical properties of actinide elements are described and related to their electronic characteristics. Using nuclear properties in understanding actinide chemistry is provided. Presentations are given on exploiting the chemical behavior of the actinides in separation, the nuclear fuel cycle, environmental behavior, and materials.

Actinide II starts with plutonium chemistry, introducing f-electron behavior through the discussion of plutonium metal properties. The course continues with plutonium compound synthesis, and completes with lawrencium chemistry.

As a part of CHEM 793-1002, a laboratory component is introduced in April. This laboratory component is designed to give students hands-on experience on the manipulation of uranium (²³⁸U) in solution and in the solid-state. The work will allow students to perform liquid-liquid extraction, as well as solid-state synthesis of uranium compounds. This laboratory component is divided in 6 classes:

- Class 1: handling of uranium

- Class 2: Extraction of uranium into dodecane/TBP; Back extraction of uranium into HNO₃
- Class 3: Preparation of ammonium diuranate
- Class 4: Decomposition of ammonium diuranate to UO₃
- Class 5: Conversion of UO₃ to UO₂
- Class 6: Preparation of UF₄

In those classes, students will work in the radiochemistry laboratories at the HRC under the supervision of the instructor. Prior the classes, students will be required to complete the radioprotection and protocols trainings and perform bioassay prior and after the completion of the classes.

UNLV Policies

Academic Misconduct—Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the *Student Academic Misconduct Policy* (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

Copyright—The University requires all members of the University Community to familiarize themselves **with** and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC)—The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Religious Holidays Policy—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor **within** the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or **within** the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching—The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:

<https://www.unlv.edu/provost/teachingandlearning>

<https://www.unlv.edu/provost/transparency>

Incomplete Grades—The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Library Resources—Students may consult with a librarian on research needs. For this class, the subject librarian is https://www.library.unlv.edu/contact/librarians_by_subject. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

Tutoring and Coaching—The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

UNLV Writing Center—One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.

Rebelmail—By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu.
Emailing within WebCampus is acceptable.

Final Examinations—The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

CHEM 793-1002 Actinide Chemistry II

Week	Date	Instructor	Lecture	Topic
1	January 18	FP	1	Americium-1
2	January 23	FP	1	Americium-2
	January 25	FP	1	Americium-3
3	January 30	FP	2	Curium-1
	February 1	FP	2	Curium-2
4	February 6	FP		Correction homework 1-2
	February 8	FP	3	Berkelium
5	February 13	FP	4	Californium
	February 15	FP		Correction homework 3-4
6	February 20	FP	5	Einsteinium
	February 22	FP	5	Einsteinium
7	February 27	FP	6	Fermium to Lawrencium
	March 1	FP		Correction homework 5-6
8	March 6	FP		Introduction to laboratory class
	March 8	FP		Laboratory 1 : Handling of uranium
9	March 15	FP		Laboratory 2 : Extraction of Uranium
10	March 22	FP		Laboratory 3 : Preparation of $[\text{NH}_4]_2\text{U}_2\text{O}_7$
11	March 29	FP		Laboratory 4 : Preparation of UO_3
12	April 5	FP		Laboratory 5 : Conversion of UO_3 to UO_2
13	SPRING BREAK			
14	April 19	FP		laboratory 6 : Preparation of $[\text{NH}_4]_4\text{UF}_8$
15	April 26	FP		Laboratory 7 : Preparation of UF_4
16	May 8	FP		Final