Spring 2019  
Chemistry 503 - Chemistry of the f-Elements  3 credits

Lectures: MWF 10:10-11:00 AM;  
WEBS B8  
Instructor: Profs. Nathalie A. Wall  
nawall@wsu.edu  
Office: Fulmer 628  
Office hours: by appointment only

Prerequisite: General Chemistry

Student Learning Outcome: At the end of this course the student will have learned the inorganic chemistry and analytical chemistry of lanthanides and actinides.

Course Website: Blackboard (https://learn.wsu.edu) will be used for course announcements and postings. Use you net ID and password to log in. It is your responsibility to check this site regularly.

Text(s): ➔ Lanthanide and Actinide Chemistry; Simon Cotton  
➤ Chart of nuclides (for example Knolls’ at http://www.nuclidechart.com)  
➤ Chemistry of the Elements; Greenwood and Earnshaw  

The instructor will also use the book “The Chemistry of the Actinide and Transactinide Elements” (Set Vol.1-6): Volumes 1-6 4th ed. 2011 Ed.; Katz, Morss, Edelstein, Fuger. The instructor does not expect students to purchase this (very) expensive book – sufficient information will be supplied in class.

Grading:  
Average of Best 75% quizzes: 200 points  
GRADE RANGES: (guaranteed minimum grade)  
Exam 1: 200 points  
94% A 90% A- 87% B+ 83% B  
Exam 2: 200 points  
80% B- 77% C+ 73% C 70% C-  
Final Exam: 300 points  
67% D+ 63% D < 62% F

Quiz:  
Quizzes will be given on a regular basis on the material covered during previous lectures.

Exams:  
Full credit will be given only when the work is shown. Final numerical results or final equations are not sufficient. You will be penalized for showing final numerical results shown without appropriate units. All rules for significant figures apply and points will be removed for incorrect significant figures. Exam 2 will cover material acquired since Exam 1 and the final exam will be cumulative.

Exam 1: 02/06/2019 – in class  
Exam 2: 03/06/2019 – in class  
Final Exam: 04/30/2019 – 8:00-10:00 AM in classroom

Calculators: Students are expected to have and be able to use a scientific calculator. Graphing calculators are allowed, but not required. The use of any stored information/programs in a programmable calculator will be considered cheating (see ACADEMIC INTEGRITY section). PDAs, laptop computers, and/or cell phones with calculators are not allowed during exams and quizzes.

Academic Integrity: Cheating or plagiarism of any form will not be tolerated. Cheating includes, but is not limited to: copying work or allowing your work to be copied; use of unauthorized material at exams, any communication between students during an exam, and actively looking at another student’s paper during an exam. All incidences of cheating will be reported to the Office of Student Affairs. The first incidence of cheating will result in a score of zero for that assignment or exam, a second incident of cheating will result in an F for the course and possible dismissal from the University. Definitions and the processes to be used for handling complaints related to academic dishonesty are presented at http://conduct.wsu.edu/AI.
Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center. For more information contact a Disability Specialist http://accesscenter.wsu.edu, or Access.Center@wsu.edu

Classroom Safety Information: Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the “Alert, Assess, Act,” protocol for all types of emergencies and the “Run, Hide, Fight” response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able). Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI’s Run, Hide, Fight video and visit the WSU safety portal.

Withdrawing from this Course: The WSU Catalog specifies the details of the WSU withdrawal policy, as indicated below. See the course schedule for withdrawal dates.

68. WITHDRAWAL FROM A COURSE
An undergraduate or professional student may withdraw from a course after the 30th day of the regular term up through the end of the 13th week with these provisions:

(a) At the end of each term, the number of withdrawals will be counted for undergraduate and professional students. Once four withdrawals have been used, no further withdrawals will be allowed in subsequent terms. Withdrawals that result from the cancellation of enrollment will not be counted. (For those entering WSU in fall 1998 through summer 2004, once six withdrawals have been used, no further withdrawals will be allowed in subsequent terms.)

(b) After the withdrawal limit is reached, an undergraduate or professional student may, in exceptional circumstances, submit a petition through the Registrar’s Office for an exception to the withdrawal limit. See Rule 57.

(c) If a grade has been entered for a course, the grade may not be changed to a withdrawal without the instructor’s consent.

(d) Withdrawals do not reduce tuition charges or the total official hours of enrollment.

(e) For academic calendars that vary from the regular 15-week term, a prorated schedule will be used to determine the withdrawal deadline.

(f) The grade shall be marked W, and payment of the service fee shall be mandatory.

Class Expectation, Lecture Notes, Practice Problems, Textbook: Lecture materials will be presented in class. Slides or lecture notes will be provided in advance on Blackboard before the relevant lecture. However, lectures will provide much more material than posted on Blackboard and lecture attendance is strongly encouraged. Students must have their calculator and chart of nuclides at every lecture. Specific key problems will be solved during lectures; additional practice problems and associate final answers will be posted on Blackboard. Students are strongly encouraged to practice these additional exercises. One textbook is recommended for this course (see above), however Dr. Wall’s lectures do not follow any particular book for this course, allowing to expand the teaching beyond the boundaries that textbooks impose. Additional textbooks and materials will be discussed in class.

Instructor Availability: Dr. Wall’s office is located in a restricted area, not reachable by most students, faculty, and staff. Face-to-face meeting with students will occur by appointment only. Dr. Wall can be reached by email at nawall@wsu.edu.
COURSE OUTLINE:

1. Radiochemistry short overview
2. f-orbitals
3. Lanthanide (Ln) chemistry
   1) Introduction
   2) General principles of Ln chemistry
   3) Ln binary compounds
   4) Ln coordination chemistry
   5) Ln organometallic chemistry
   6) Ln aqueous chemistry
   7) Ln electronic and magnetic properties
   8) Particular case of Sc, Y, and Pm
4. Actinide (An) chemistry
   1) Introduction
   2) General principles of An chemistry
   3) An coordination chemistry
   4) Chemistry of selected An
   5) Transactinides and future elements
   6) Comparison of Properties of the Actinide and Transactinide Elements
   7) An solution chemistry
   8) An Electronic and magnetic properties
   9) An thermodynamic properties
   10) An and life cycle