

C204: Introduction to Radiochemistry  
South Carolina State University  
Environmental Sciences Field Station at Savannah River

COURSE SYLLABUS  
C204 Introduction to Radiochemistry  
Summer Session I 2018: 9:00 am-3:00 pm M, W & F  
(Departure time is 8:30 am)

Instructor's Name: Warner Ithier-Guzmán, Ph. D.  
College: Science, Mathematics and Engineering Technology  
Department: Biological & Physical Sciences  
Course Title & Number: ENV 305 – Environmental Health  
Office Hours: Monday and Wednesday 3:30-5:30 pm  
Email Address: warner.ithier@gmail.com  
Classroom:

Required Textbook: Radiochemistry and Nuclear Chemistry 4th Edition  
Gregory Choppin Jan-Olov Liljenzin Jan Rydberg Christian  
Ekberg

## I. COURSE DESCRIPTION

C240 – Introduction to Radiochemistry: This course is designed for students pursuing careers in environmental studies and/or health professions. This course introduces students to basic concepts of radiochemistry and radiation measurements. Discussion will be based on the use of radiation, sources of radiation and measuring radiation. Discussion will also include the biological effects of radiation as well as the global legacy of radiation to the world environment. Subjects to be addressed will include radiation types, radiation decay, nuclear energy, biological effects of radiation, radiation detection & measurements, radionuclides in nature, nuclear accidents.

### Prerequisites:

1. Instructor permission and sophomore standing; co-requisite Chemistry course
2. All students are required to pass a General Employee Training (GET) multiple-choice exam as a condition of retaining your internship. A 3-4 hour training course will precede the exam. Passing the exam is not difficult and only requires your attention during the training course.

## II. COURSE OBJECTIVES

Course Objective: To explore the fundamental aspects of nuclear and Radiochemistry, with emphasis on the determination of radioactive species and the application of nuclear processes, radioactive materials, and radiochemical techniques in chemical analysis.

To educate students how radiochemistry influence humans and the environment To make students proficient in reading research papers in radiochemistry, and analyze and interpret results.

## III.EXPECTED MEASURABLE OUTCOMES

It is expected that upon completion of this course, students will understand the origins of nuclear instability, the fundamental aspects of radioactive decay, the modes of interaction of radiation with matter, the relationship between the nature of these interactions and radiation detection measurement, and the analytical applications of nuclear reactions and nuclear materials

Students will be given individual or group assignments, projects, reports in which they will be required to explain the applications of the techniques and topics learned.

## IV. OUTLINE OF COURSE CONTENT

COURSE SCHEDULE – Subject to change

Week	Topic	Reading Assignment	Field Activity
1	a. Course Introduction b. Radioactive Elements c. Radioactive Decay d. Discovery of Isotopes e. Atomic Models f. Nuclear Power  Final Projects topics discussion.	Chapter reading and hand-outs for ALL topics covered  Chapter 1 and Assign reading <i>Radiocesium discharges and subsequent environmental transport at the major US weapons production facilities</i>	SRS Movie
2	a. Nuclear Mass & Stability	Chapt. 2 &4	Visit an PAR Pond

	b. Fundamentals of Radioactive Decay	Chapter 5	Visit the radioactive waste storage facility at SRS
3	a. Radionuclides in Nature b. Transuranium Elements c. Interactions of Mater and Radiation d. Radiation Protection	Chapter 13 Chapter 14 Chapter 8 Chapter 15	Visit MOX Visit PAR Pond with one of the ecologist from the ECORADIO LAB from SRS
4.	a. Soil & groundwater contamination lecture b. Gamma Spectroscopy c. Conservation Laws d. Behavior of Radionuclides in Nature	Guest Speaker Dr. Walt Kubiilus  Chapter 10 Chapter 21	to F-Area Seepage Basin remediation  Talk from Sean Poppy (or another resourse from SRS) on the effects of radiation on Wildlife.
Final Week	Nuclear Power  Summary of summer section and presentations	Chapter 19-21	

## VI. LIBRARY AND INTERNET ASSIGNMENT

In addition to assignments and projects, students will be given library and Internet assignments for which they will be required to submit reports.

## VII. SPECIAL COURSE REQUIREMENTS

The course is "FIELD ORIENTED", therefore be prepared to go into the field everyday. Everyday you should bring with you: water, food, a change of clothing, long pants (light weight), field boots, hat, and anything else you think you may need. Each course topic will have a supporting field/hands-on activity scheduled by the instructor.

A. Attendance: **Attendance is mandatory.** Students are expected to read assignments before class. A lab write-up will be required after each field-trip laboratory visit. You only are allowed to be late once, after that you are out of the program. Unless its an emergency or medical condition.

B. Make-up Exams: Make-up exams will be given only if student presents evidence of being excused officially by instructor. There will be no make up for pop quizzes.

C. Office hours: Instructor will be available during the office hours posted above. However, meeting with the instructor outside of office hours requires an appointment.

D. Equipment Care: Where applicable, each student is expected to exercise extreme caution and care when using any equipment. No piece of equipment is to be operated by any student until he or she has been thoroughly instructed on the equipment's use and given permission to do so.

E. Academic Integrity: All students shall refer to the most current South Carolina State University Handbook for instructions on Academic Integrity. The highest standards of academic integrity shall be expected of all students. As such, academic dishonesty is prohibited. Academic dishonesty includes, but is not limited to cheating on examinations, unauthorized collaboration on individual assignments, unauthorized access to examination materials, and plagiarism. Plagiarism is defined as the unauthorized use of ideas and/or phrases and representing the same as your own, intentionally or unintentionally. As such, a writer may not use in his or her writing the language, ideas, phrases, or sentences taken verbatim from another's writing unless due credit is given to the writer by quotation and citation. Students found guilty of plagiarism will fail the course. If any student is unsure whether an act may violate integrity policy, please consult with the instructor before engaging in the act.

## VIII. METHOD OF EVALUATION

Evaluation will be based upon tests, quizzes, lab reports, term paper, literature reviews, preparedness, participation and field.

There are no make-up lecture exams unless a documented, excusable reason is presented (for example: doctor's bill or statement, tow truck bill, police report, etc). There will be no lab make- ups.

If you have a learning or physical disability which might affect your performance in this class, inform the instructor and Director as soon as possible in order to verify your status and provide you with appropriate assistance.

**Nature of Examinations**

Multiple choice questions, Fill in the blanks, True / False, short answers or any combination of these. All exams will be announced.

**Teaching Methods**

Class instruction will include: lecture, discussion, class work, laboratory demonstrations and field visits.

<b>Requirement</b>	<b>Date</b>	<b>Weight</b>
<b>Two (2) one hour lecture tests</b>		40%
<b>Lab/Field Reports</b>		25%
<b>Final Comprehensive Presentation &amp; Poster</b>		10%
<b>Participation</b>		15%
<b>Total</b>		100%

Note: All exam dates are tentative and are subject to change at the instructor's discretion.

**IX. GRADING SCALE**

Letter Grade	A	B	C	D	F
Score	100-90%	89-80%	79-70%	69-60%	Below 60%