# Nuclear Chemistry – NUC K118 - COURSE SYLLABUS

Instructor: Charles Mihalko Room: class D-212 Class Time: Tue 1:30- 2:20 pm E-mail: <u>chuck.trcc@mihalko.net</u>

**Course Description for Nuclear Chemistry – NUC K118** 1 CREDIT HOUR Nuclear Chemistry Prerequisite: CHE K121, MAT K186, NUC K100

This course is an introduction to the basic concepts of nuclear reactor chemistry. Topics covered include oxidation-reduction reactions, principles of corrosion, corrosion control practices, and important nuclear chemical reactions One, 1-hour lecture.

# **Course Topics/Content**

#### Classroom/Lecture (15 hours total)

INTRODUCTION – 3 hours

- 1. Chemistry as it pertains to nuclear power plants
- 2. Chemicals used in power plants
- 3. Electrolytes and conductivity

#### ACIDS AND BASES - 3 hours

- 1. Neutralization equations
- 2. Complete and incomplete neutralization
- 3. pH

# OXIDATION - REDUCTION - 3 hours

- 1. Basic redox reactions
- 2. Lead-acid battery
- 3. Nernst Equation

#### PRINCIPLES OF CORROSION AND CORROSION PREVENTION - 3 hours

- 1. General corrosion
- 4. Pitting corrosions
- 2. Galvanic corrosion
- 5. Hydrides
- 3. Stress corrosions
- 6. Zircaloy crevice corrosion

# ASSOCIATED TOPIC IN REACTOR CHEMISTRY - 3 hours

- 1. Radionuclides in coolant
- 2. Plant analysis
- 3. Ion Exchange

#### Course learning outcomes/Expected performance criteria

The student will gain a good background in general inorganic chemical concepts. The student will become familiar with corrosion problems in power plants with an emphasis on how these problems can be minimized or prevented. Additionally, the development of plant analysis and their application to plant operational performance will be perfected as a diagnostic tool.

# Relationship of course to Criterion 5 and Program Outcomes:

This course is an advanced chemistry course specifically applied to nuclear reactor systems that helps satisfy Program Outcomes # 1, 2, 3, 4, and 5.

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#### **Required Texts/Supplies:**

#### Handouts

### Expectations, Attendance, Grading, Due Dates, and Academic Honesty:

**Attendance**- I will take attendance at each class meeting. Because many of the ideas for out-ofclass work will be discussed in detail during class, it is to your advantage to attend regularly. One or two missed classes will not impact your work negatively as long as you make up the work, but excessive absences (more than three) will most likely impact your work negatively.

#### General:

1. Come to class prepared to learn. We will have fun too!

Work the sample problems in the book as you read & study the material. We will be doing a lot of math work in class, for homework, & assessments. Have paper, pencils & calculator.
Take notes as you study. Write down your questions. Try to find the answers via Internet search. Bring the questions to class. Chances are, that we all will learn from the questions.
Actively participate in class!

#### Methods of Evaluation:

- Exams (One mid-term and a final exam)
- Quizzes / Assignments
- Participation / Attendance

The final course grade will be computed according to the f	following formula:
Final Exam Average	30%
Mid-term Exam Average	30%
Quiz / Assignments / Class Participation	40%
Final Grade	100%

A= 90-100% B= 80-89% C= 70-79% D= 60-69% F= below 60%

# Class/Lecture:

- Weekly "Exit Tickets" will be completed after the end of class. They are due within two days. No late work will be accepted. Your responses are important to help assess the understanding of the topic and what questions you might still have. You will be asked to document 3 important things we discussed in class, 2 questions you still have, and one connection you would like to share. Five minutes max.
- Quizzes / Assignments will be given after every class and will be due before the beginning of the following class. No late work will be accepted. The lowest score will be dropped in computing your grade. This work will be open book/open notes.
- A mid-term exam (in-class) will be given during the semester and will be scheduled at least one week in advance. If you must be absent from an exam, consult with me BEFORE the exam is given. This in-class exam will be open book/open notes.
- There will be a comprehensive take home final exam at the end of the semester. This exam will be open book/open notes. The completed exam will be due in one week.

Please remember that it is your responsibility to keep up with assignments and paper due dates as outlined by the syllabus. Contact me if you miss a class to get any handouts from the session you did not attend.

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# If a class is cancelled for some reason, expect to do the work and turn in any papers associated with the cancelled class in the following session.

#### Campus and Class Policies:

**Academic Integrity** - Academic integrity is essential to a useful education. Failure to act with academic integrity severely limits a person's ability to succeed in the classroom and beyond. Furthermore, academic dishonesty erodes the legitimacy of every degree awarded by the College. In this class and in the course of your academic career, present only your own best work; clearly document the sources of the material you use from others; and act at all times with honor.

**Academic Dishonesty** - Student Discipline Policy, section 2:10, Board of Trustees of Connecticut Community Colleges. Academic Dishonesty shall in general mean conduct which has as its intent or effect the false representation of a student's academic performance, including but not limited to (a) cheating on an examination, (b) collaborating with others in work to be presented, contrary to the stated rules of the course, (c) plagiarizing, including the submission of others' ideas or papers (whether purchased, borrowed, or otherwise obtained) as one's own, (d) stealing or having unauthorized access to examination or course materials, (e) falsifying records of laboratory or other data, (f) submitting, if contrary to the rules of a course, work previously presented in another course, and (g) knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

*Withdrawal policy*- A student who finds it necessary to discontinue a course once class has met must provide written notice to the registrar. Withdrawal forms are available at the Registrar's office. No punitive "W" grades are assigned to any withdrawal requested before the unrestricted withdrawal deadline for the semester. Withdrawal requests received after this deadline must bear the signature of the instructor. No withdrawals are permitted after the last class preceding the final exam. Students who do not obtain an official withdrawal, but simply stop attending classes, run the risk of receiving an "F" grade for the course.

**Students with disabilities**- Students with disabilities are guaranteed reasonable accommodations under the provisions of the Americans with Disabilities Act of 1992. Disclosure of a disability must be voluntary. If you have a hidden or visible disability that may require classroom or test-taking modifications, please contact the Student Development Services office at 860-383-5217. Please see the Three Rivers Community College Catalog for additional policies and information.

*Classroom Behavior*- This is a college course for committed students, and I expect you to maintain proper decorum in the classroom. Treat your fellow students with maturity and respect at all times. Extend the same attitude towards your instructor. **Immature behaviors will simply not be tolerated; if I am forced to address a behavior issue more than once, you will be asked to leave and not return to class.** 

#### **Revisions to Syllabus:**

The information contained in the syllabus is subject to revision at my discretion. I will inform the class of any changes that are made. If you miss a class, check with a classmate upon your return to verify that you have the most up-to-date information.