

## **Nuclear Chemistry – NUC K118 - COURSE SYLLABUS**

**Instructor:** Charles Mihalko

**Room:** class D-211

**Class Time:** Tue 3:30- 4:20 pm

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### **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**

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|-----------------------|-------------------------------|
| 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-of-class 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 / Due Dates:**

1. *Come to class prepared to learn. We will have fun too!*
2. *Come to class prepared as if you will teach the class!*
3. *Work the example problems in the book as you read & study the material. Occasionally we will be doing math work in class, for homework, & assessments. Have paper, pencils & calculator.*
4. *Take notes, highlight & tab 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.*
5. *All written work is due on the assigned date. Late work will automatically have ten percent deducted from the grade. Work over one week late will not be accepted and a grade of zero will be assigned. If you have any questions or concerns about getting your work in on time, please contact me before the due date.*
6. *Actively participate in class!*

#### **Methods of Evaluation:**

- *Exams (Two exams)*
- *Quizzes / Assignments (Weekly)*
- *Participation / Attendance (Weekly)*

*The final course grade will be computed according to the following formula:*

<i>Exams (Two exams)</i>	<i>50%</i>
<i>Exit Tickets</i>	<i>5%</i>
<i>Quiz / Assignments / Class Participation</i>	<i>45%</i>
<i>Final Grade</i>	<i>100%</i>

#### Grading Scale:

Letter	Percent	Letter	Percent
A	94-100	C	73-76
A-	90-93	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	<60

#### **Class/Lecture:**

- Weekly "Exit Tickets" will be completed after the end of class. They are due by Wednesday Midnight. 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 to share. The lowest score will be dropped in computing your grade. Spend no more than five minutes on this assignment. Exit tickets will be submitted via email.

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- Quizzes / Assignments will be given after every class and will be due before the beginning of the following class. 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.**

**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**

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**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.**

**Online learning portfolio** - As a student you will maintain an online learning portfolio using a college-designed template in Digication. Through this electronic tool you will have the opportunity to monitor your own growth in college-wide learning. It may even help you determine a major that is best suited to you. You will be able to keep and maintain your learning portfolio after graduation. A Three Rivers General Education Assessment Team will select and review random works to improve the college experience for all. If your work is selected and reviewed for assessment purposes, it will remain anonymous and private. Digication provides a “place” where you will connect your learning from the classroom, college, and life in general. Sometimes when you review all of the work you have done and think about it, you end up learning something different and perhaps unexpected. Please review your course outlines to determine what assignments to upload into the TRCC Digication template and please post your own choices, as well. Have fun in learning!

### **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.