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Chem 698-101: Chemistry, Sustainability and Circular Economy

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**Chem698-ST: Chemistry,
Sustainability and Circular
Economy**
Fall 2023 Syllabus

[NJIT Academic Integrity Code](#): All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description:

The Earth is in the era of “Anthropocene”. Chemistry and its applications have been driving many “grand challenges” today, such as climate change, water, energy and food security, health and safety, and biodiversity. Achieving the United Nations Sustainable Development Goals (SDGs) requires a transformational change in chemistry and its applications. The goal of this course is to substantiate student’s knowledge and experience of chemistry from broad societal, economic, environmental, and governance (SEEG) perspectives and better prepare a new generation of chemists and leaders in the chemical enterprise to understand and address the areas of critical needs for the transformation to achieve long-term sustainability goals.

Number of Credits: 3

Prerequisites: Graduate standing

Course-Section and Instructors

| Course-Section | Instructor |
|----------------|---|
| CHEM698-101 | Dr. Zeyuan Qiu; zeyuan.qiu@njit ; 973-596-5357 |

Office Hours: Wednesdays 4-5pm or by appointment through email

Required Textbook: There is no textbook required. All teaching materials including the readings are provided in the Canvas course website.

University-wide Withdrawal Date: The last day to withdraw with a W is Wednesday, November 13, 2023. It will be strictly enforced.

Learning Outcomes:

- Expand the understanding of sustainability and circular economy and their fundamental linkages to chemistry and its applications

- Identify and articulate the contemporary sustainability challenges of chemistry and its applications from broad societal, economic, environmental, and governance (SEEG) perspectives
- Conduct literature review and critically analyze the SEEG impacts of the development and applications of certain chemicals
- Formulate innovative research questions, methods and strategies on chemical development and applications following the principles of sustainability and circular economy
- Develop and apply sustainability ethics and social responsibility in pursuing career in chemistry and its applications

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

| | |
|-------------------------------------|-----|
| Class Activity Participation | 10% |
| Weekly Assignments | 20% |
| Midterm Exam | 30% |
| Term Paper | 40% |

Your final letter grade in this course will be based on the following tentative curve:

| | | | |
|-----------|-----------|----------|-----------|
| A | 90% above | C | 70-75% |
| B+ | 85-90% | D | 60-70% |
| B | 80-85% | F | Below 60% |
| C+ | 75-80% | | |

Attendance Policy: Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.”

Class Activity Participation (10%): This course is taught using a problem-based learning strategy. There are significant amounts of activities that are arranged for the students to engage and learn. The attendance and participation are critical to achieving the learning outcomes.

Weekly Assignments (20%): There are weekly assignments on the topics being discussed weekly before the midterm. The assignment will be submitted online on time.

Midterm Exams (30%): There will only be one exam: a midterm in the eighth week of the semester. The midterm will cover the materials from the first week to the seventh week of the semester.

Group Project (40%): The students will form different groups of 2-3 student and learn how to critically identify a chemistry issue relevant to today’s “grand challenges”, develop a comprehensive understanding of the issue from societal, environmental, economic and governance perspectives and identify the multi-level solutions to the issue by apply the fundamental principles in sustainability and circular economy. The group project will be evaluated through a sequence of class activities and interactions with the course instructor and project mentors throughout the second half of the semester such as topic identification and assessment, peer review, project draft report, project presentation and final group project report.

The midterm exam is tentatively scheduled on **October 25, 2023**. Please make plans to avoid missing the midterm exam.

Late Submission: The score for late submission will be deducted 5% a day until the maximum deduction of

50%. All missing assignments will be given a score of zero.

Makeup Assignment/Exam Policy: There will normally be **NO MAKE-UP Assignments OR EXAM** during the semester. In the event that a student has a legitimate reason for missing an assignment or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the assignment or exam will be missed so that appropriate steps can be taken to make up the grade.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

ADDITIONAL RESOURCES

Accommodation of Disabilities: Office of Accessibility Resources and Services offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Marsha Williams-Nicholas, M.S., E.D.M., Accessibility Resources and Services Manager at the Office of Accessibility Resources and Services at **973-596-2994** or via email at marsha.williamsnicholas@njit.edu. The office is in Kupfrian Hall 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <https://www.njit.edu/accessibility/>

Important Dates See: Fall 2023 Academic Calendar, Registrar

<https://www.njit.edu/registrar/fall-2023-academic-calendar>

| Date | Day | Event |
|------|-----|--|
| Sept | 4 | Labor Day. University Closed |
| Sept | 5 | First Day of Classes |
| Sept | 11 | Last Day to Add/Drop a Class |
| Sept | 11 | Last Day for 100% Refund, Full or Partial Withdrawal |
| Sept | 12 | W Grades Posted for Course Withdrawals |
| Sept | 18 | Last Day for 90% Refund, Full or Partial Withdrawal - No Refund for Partial Withdrawal after this date |
| Oct | 2 | Last Day for 50% Refund, Full Withdrawal |
| Oct | 23 | Last Day for 25% Refund, Full Withdrawal |
| Nov | 13 | Last Day to Withdraw from Classes |
| Nov | 21 | Thursday Classes Meet |
| Nov | 22 | Friday Classes Meet |
| Nov | 23 | Thanksgiving Recess Begins. No Classes |
| Nov | 26 | Thanksgiving Recess Ends |
| Dec | 13 | Last Day of Classes |
| Dec | 14 | Reading Day 1 |

| | | |
|-----|----|-----------------------|
| Dec | 15 | Reading Day 2 |
| Dec | 16 | Saturday Classes Meet |
| Dec | 17 | Final Exams Begin |
| Dec | 23 | Final Exams End |
| Dec | 25 | Final Grades Due |

Course Outline

| Session | Date | T | Assignment |
|---------|-------|--|------------------------------------|
| 1 | 9/6 | Introduction | Assignment 1 |
| 2 | 9/13 | Chemistry, sustainability, and circular economy | Assignment 2 |
| 3 | 9/20 | Science perspective | Assignment 3 |
| 4 | 9/27 | Green chemistry, catalysis and circular economy | Assignment 4 |
| 5 | 10/4 | Economics perspective | Assignment 5 |
| 6 | 10/11 | Governance perspective | Assignment 6 |
| 7 | 10/18 | Social perspective | Assignment 7 |
| 8 | 10/25 | Midterm | Group Project: Research Objectives |
| 9 | 11/1 | Chemistry, circular economy and climate | Group Project: Refined Objectives |
| 10 | 11/8 | Chemistry, circular economy and energy | Group Project: Progress Review |
| 11 | 11/15 | Chemistry, circular economy and water | Group Project: Draft |
| 12 | 11/29 | Chemistry, circular economy and food | Group Project: Peer Review |
| 13 | 12/6 | Chemistry, circular economy, biodiversity and | Group Project: Refinement |
| 14 | 12/13 | Class Presentation | |
| 15 | 12/20 | Group Project Paper Submission | |

Updated by Zeyuan Qiu - August 2023
 Department of Chemistry & Environmental Sciences (CES)
 Course Syllabus, Fall 2023
