Introduction to Chemistry Education (Chem 387)

COURSE INFORMATION

Overview
This course is designed to serve you with an introduction to pedagogy in chemistry and related STEM fields, placing a strong emphasis on gaining experience in teaching chemistry as an undergraduate teaching intern (TI) or an undergraduate teaching assistant (TA). The course has two main components:

- Lecture – you will meet in class, in person, with an instructor once per week for 80 minutes.
  - If needed, the class will meet synchronously remote using a video conferencing system (e.g., Zoom) during our normal class meeting times. If we need to use this option, you will be notified in advance.
    - The synchronous remote format could be used to support those of you who are assigned to synchronous remote or online positions.
    - The synchronous format could also be used if the University declares emergency remote teaching again due to situational changes during the pandemic.

- Learning Session – as a “teaching intern in training,” you will each hold a 1-hour session per week in the form of an office hour, review session, skills workshop, or study session, or you could be assigned to an active learning workshop for a General Chemistry or Organic Chemistry course. This requirement can also be completed as a laboratory TA, but the TA option should be arranged, in advance, with the instructor on a case-by-case basis.

These two components will constitute the three (3) credits in the course, and each will count toward the letter grade.

Pre-Requisites
Enrollment in this course is by invitation or through intention of pursuing a chemistry education minor. Invitations are made based on success in General Chemistry I and II and interviewing for the TI positions.

Relationship to Chem 493/494 (for Chemistry TIs)
Chem 493 and 494 are Chemistry Teaching Internship courses for the Fall and Spring semesters, respectively. The activities and content focus of 493/494 are different from Chem 387. Students enrolled in 493/494 concentrate more fully on the practical application of peer mentoring and the general chemistry content in the course they are assigned to support; whereas students in 387 engage with formal pedagogical training, learning theories, and evidence-based best practices. All students in the Certificate in Chemistry Education program will go on to take at least two credits of the Teaching Internship course in addition to completion of the 387 course. Because 387 already includes one learning session as part of the course, chemistry TIs should not concurrently sign up for the Teaching Internship seminar (01:160:494) unless they are assigned to
additional TI office hours or workshop sessions, which should be coordinated with Dr. Anna Kornienko (for 159/160/161/162), Dr. Altinis-Kiraz (CHM 165/166) or Dr. Marc Muniz (163/164).

Course Goals
This course will provide you with the opportunity to

- Engage with primary, secondary, and tertiary literature in the fields of learning theory, educational theory, teaching techniques and best practices, and STEM education research; Discuss theories, concepts, and principles in STEM education
- Apply pedagogical content knowledge (PCK) from science and chemistry education (and educational theory, in general) to weekly learning sessions with students enrolled in General Chemistry lecture or lab courses
- Analyze reports in the STEM education and chemistry education research (CER) literature and evaluate the usefulness, applicability, and transfer of these findings to the role of academic peer leader positions (e.g., chemistry TIs, lab TAs, tutors, and workshop leaders)
- Reflect on your knowledge of education and pedagogy and how you develop this knowledge over the course of the semester
- Reflect on your experiences as chemistry teaching interns, self-evaluate your sessions with students, consider suggestions and propose changes in your methods based on feedback from peers, describe your growth and development as TIs over the course of the semester.
- Provide feedback to peers through direct observations or transcribed recorded interactions
- Synthesize your own informed opinions, arguments, and ideas about chemistry education, chemistry pedagogy, teaching (from the perspective a TI), and student learning in chemistry and other STEM courses.
- Appreciate the concept of lifelong learning, and explore how your own thoughts and understanding of concepts related to teaching and learning evolve over time

Required Materials
- No textbook is required for the course. All assigned readings will be posted on Canvas.
- For each class, regardless of in person or synchronous remote formats, it will be helpful for you to have a laptop, iPad, or tablet to connect to shared documents for collaborative activities. For synchronous remote meetings, a desktop, laptop, iPad, tablet or mobile device will be needed to connect to Zoom, the virtual conferencing system
- You are welcome to read the assigned articles and book chapters on your device, or you can print the readings on paper. Regardless of the way you engage with the readings, you should take notes, either written directly on the printed copies or, for electronic reading, by annotating on the pdfs or keeping notes in a notebook (handwritten or electronic).

Students in the CCE Program will compile their work, including papers, activities, and assignments from class at the end of the semester. These documents can become a part of the teaching portfolio (See Part IV: Artifacts).
**Classroom and Online Etiquette**

- When possible, we all appreciate silenced cell phones and when we all put our cell phones in a place where they are unlikely to distract you during class.
- Turn on your video and audio during synchronous virtual sessions when possible. Having only half a dozen students in the course this semester *should* reduce bandwidth issues during any video conferencing sessions.
- We all expect others and ourselves to be respectful during class discussions and when working collaboratively with one another. Being respectful includes listening to the speaker; giving relevant, positive, constructive, and respectful feedback; and being patient.
  - It often takes several seconds (which can feel like a long time during in person discussions for those who are quick retrievers) for someone to think about a question and formulate their response.
    - Remember to face the speaker to show you are listening. This might require you to move in your chair (or move your chair) because we will often be working in small groups.
  - It often takes several seconds (which can feel like an eternity in a virtual meeting) for someone to unmute and start responding verbally. Typing into a chat window also takes time. Communication will not be as quick as it tends to be when we are all in person. Let’s take this opportunity to reflect, think deeply, and be thoughtful with our responses.
    - Remember that the online format of our class meetings can make it difficult to read facial cues (especially if videos are off or if we have to wear a mask when joining from a public place), receive verbal feedback if audio is off, and infer tone through text/chat communication.
    - Moreover, “Zoom fatigue” is real and can pose a challenge as the day wears on, as the week wears on, and as the semester wears on.
- We will all try our best to approach interactions with a positive attitude and an assumption that others have good intentions. We can and will address issues when they arise, but let us not start from a place where the assumption is that the other person is intentionally being rude, offensive, disrespectful, distracted, or disinterested.
- Be respectful of all General Chemistry instructors, staff, and students. Always remain professional, calm, and polite when speaking to or about students, TIs, and faculty members.
- This class is meant to be a safe space for sharing experiences, listening and empathizing, and seeking/giving advice. However, these interactions require those sharing experiences or seeking advice to put themselves in a vulnerable position that requires a trust that students and instructors will maintain confidentiality of the situations and contexts. What is shared in class should not be repeated outside of class without explicit permission from the person who shared it. One way to think about this is: *take the lessons and leave the details.*

**Course Policies**

- You are encouraged to check Canvas and your email on a regular basis regarding this course. Although Announcements are also sent as emails, the Announcements module is helpful for keeping the record of all posted announcements and updates. Feedback from
instructors and peers will be provided through the Canvas Assignments Module, almost always through rubrics and comments within the Assignments.
  o As the instructor, I try to avoid sending lots of Announcements, although I will send announcements to notify you of any changes to the schedule or class format, as well as when some assignments are available or graded.

● Your participation is important not only for your own learning, but for the learning of everyone in the class. Your participation grade is a combination of individual work (submitting the reading guide and arriving to class on time) and group work during class. Ideally, you would speak to, or email, me, your instructor, before an intended missed class, if you know you will be unable to make it to class. While contacting me does not necessarily guarantee an excused absence, it is usually the case that we can work out a solution for you to make up the work for most of the participation points for class activities by completing an individual make up assignment.

● Deadlines for major Assignments can be extended for the whole class or on a case-by-case basis. You are encouraged to contact me, your instructor (in advance, if at all possible), if you need an extension.

Special Needs
Specific accommodations may be made for you or any student who requires such support. Visit the Office of Disability Services in person or online (https://ods.rutgers.edu) to learn more about potential support and eligibility. You should speak with me, your instructor, as early as possible in the semester if there are any additional concerns about access and/or accommodations.

Honors Credit
If you are enrolled in the Honors College or SAS Honors Program, you can choose to earn Honors credit for this course by completing supplementary work. See the “Honors Track” information at the end of this document.

COURSE COMPONENTS

Participation – 15%

Individual
This course is designed to be an active learning environment; your participation is essential. You are responsible for coming to class prepared, which means having completed all readings and assignments so that you are ready to discuss the topic. Your individual accountability will involve submitting responses to the assigned Reading Guide at the start of class (see more details below) and arriving to class on time.

Group
You will engage in group activities related to the readings during each class period. When working with a group, it is important that all members contribute and work well with other members. You will earn the same group participation points as everyone else in your group, and your participation depends on your groups’ teamwork, creativity, and the ability to stay on task.
You (as an individual and as part of a group) automatically start with full credit for participation each day, but you can lose participation points if you do not engage in class discussion and activities, do not work collaboratively with others in class, or are intentionally disrespectful to others during class.

**Weekly Reflections – 10%**
Reflections are due on Canvas’ Discussion Forum the week after the class period meets, on Wednesdays by 11:59 pm. Students should reflect on both their time in class and their learning session from the previous week. Instructions and questions for students to address will be posted on Canvas each week. There will be a minimum of 10 reflections during the course of the semester. Additional reflections are included as optional reflection assignments and can be used to make up any missed points from the required 10 reflection assignments.

In addition to submitting your own reflection, you will be asked to comment on at least one of their classmates’ reflections each week. Part of earning points for the reflection assignment includes your response to a peer. Your comments to peers should be relevant and meaningful, such as offering a suggestion or words of encouragement, asking or answering questions, or providing specific feedback or remarks. You should submit your comments by the following Wednesday each week to earn full credit for the response part of the assignment.

Because reflections are essential to becoming more self-aware of one’s own strengths and areas of improvements, I, your instructor, will often post a reflection about my thoughts about class activities. You are welcome to comment on my posts, but this will not count as responding to at least one classmate’s post each week.

**Learning Goals & Surveys: 5%**

**Initial Semester Goals** – At the beginning of the semester, you will list your goals for this course, the CCE, professional career, academic progress or outcome, and participating in the TI/TA program. Goals should be unique to your specific contexts, such as your situation, such as your intended career path. If you are in the CCE Program, the Goals assignment will become Part I of your teaching portfolio.

**Surveys** – Throughout the semester, surveys will be administered through Canvas during class or as part of weekly reflections. These surveys are meant to be informative to you as you complete them. Sometimes I, the instructor, will use the responses to inform the design of class activities. Unless otherwise stated, responses to survey items will not be shared with other students in the class.

**Application, Analysis, and Extension (AAE) Exercises – 15%**
As their name implies, AAE Exercises will include prompts that encourage you to apply course concepts to authentic teaching and learning scenarios, analyze scenarios about teaching and learning, or learn additional concepts that extend, or expand upon, the topic(s) directly included in the course. AAE Exercises can include short text and/or videos
and you could be asked to provide written responses or answer fixed-response or open-ended items. Some AAE Exercises will be administered through Canvas and the PlayPosit interactive video system. Some questions or prompts might ask students to consider personal experiences as students or as TIs/TAs and critique, assess, or evaluate those experiences using concepts, principles, and techniques discussed in class. A total of nine (9) AAE Exercises will be available on Canvas throughout the semester, and students are required to submit responses to at least five (5) of these assignments. Three (3) of the five submissions need to have a DIAE (* Diversity, Inclusion, Access, and Equity) designation. At least six (6) of the nine (9) AAE Exercises will be designated as addressing diversity, inclusion, access, and equity. You are welcome to submit additional assignments, and, if more than five (5) assignments are submitted, the highest five scores will count towards the grade.

**Peer Observation (PO) - Learning Session Evaluation – 12%**
You will observe a fellow TI/TA during the peer learning session and write a paper that addresses what happened during the session and how the session connects to the topics discussed in this class. Observations will be scheduled based on availability. You will receive their peer’s feedback and will submit a reflection on this feedback. One goal of this assignment is for you to specifically practice providing written feedback to a peer.

**Transcript Analysis (TA) Project – 12%**
You will record and transcribe a short interaction (4-5 min) while working with one or more students during your learning session. You will analyze this interaction with other students in class through the lenses of principles, theories, and practices we have been discussing in class. You will work in groups during class to provide feedback to each other on your interactions, and you will have the opportunity to reflect on how you can improve your practice. One goal of this assignment is for you to specifically practice providing verbal feedback in real time to your peers.

**Transcript Annotation & POTA Reflection – 6%**
You will annotate your transcript based on the feedback from your peers and your own thoughts about the interaction. You will submit a single reflection that combines what you learned through the Peer Observation and the Transcript Analysis projects.

**Final Paper: Teaching Philosophy Statement – 25%**
By writing a Teaching Philosophy Statement, you have the opportunity to communicate your beliefs about both teaching and learning and to share your experiences through describing relevant examples. While all teaching philosophy statements are unique to the author and allow for relative flexibility in their structure, there are some guidelines that will be described for the assignment, including proper citations and references. As a reminder, citations are required because this is a paper submitted as part of a course where you explicitly learned about educational theory and pedagogy. If you are participating in the CCE Program, this paper will become Part II of the teaching portfolio.
**Grading Policies**

**Late Submission Policy for Assignments**
You are encouraged to submit assignments on Canvas by the due date/time. Assignment submissions will remain open for the duration of the course. You are welcome to submit assignments after the due date/time. Assignments submitted after the due date/time are eligible for partial credit, up to half of a letter grade below the score on the rubric for each day (24 hour period) the assignment is late. For example, if you submit a paper that earns an A grade one day late, you will earn a B+; two days late and you will earn a B.

If you are unable to attend class on a day that an assignment is due, you are encouraged to contact the instructor prior to the class period to confirm the due date and/or request an extension. Traumatic and unexpected events happen; they are unwelcome and often impact many aspects of our lives, including classwork. To acknowledge how difficult these times are, if you contact the instructor within 24 hours of the event, the instructor will work with you to complete makeup work and/or arrange an extension for the assignment. You may be asked to provide documentation. Unless prior arrangement is made with the instructor, assignments submitted more than 7 days late will not be accepted. Remember that it is always preferred for students to ask for make-up work prior to a planned absence (e.g., medical school interview).

**Resubmission Policy**
With the exception of the Midterm, the Draft of the Teaching Philosophy Statement, and any peer review or feedback completed in class, written assignments may be resubmitted once, within one week of receiving the grade, in order to earn back a maximum of half of the points that were not earned on the first attempt. For example, if a student receives an 85% on Paper I, he or she may resubmit it within one (1) week of receiving a grade to earn up to 7.5% back, resulting in a final grade of up to a 92.5%.

**Extra Credit**
No extra credit assignments are planned in advance for this course, although optional weekly reflections are planned, which can be used to replace missing or unearned points within this grading category. As the instructor, I reserve the right to assign extra credit at my discretion or if an extenuating circumstance warrants it. In all cases, extra credit will always be offered to the entire class.

**Grading**
Grades in the course will follow this scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>A</th>
<th>B+</th>
<th>B</th>
<th>C+</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>90-100</td>
<td>85-89</td>
<td>80-84</td>
<td>75-79</td>
<td>70-74</td>
<td>60-69</td>
<td>&lt;59</td>
</tr>
</tbody>
</table>

Due to the resubmission policy, final grades are unlikely to be rounded up. If you have any questions or concerns about your grade on an assignment or your overall grade, you should bring your question(s) to me, the instructor immediately, rather than waiting until the end of the semester. Remember that the end of the semester is not an ideal time to request extra credit or reconsideration of a grade on an assignment.
**Honors Track - If Applicable**

Students in the SAS Honors Program or Honors College may opt to take this course for Honors credit. This decision must be made in the first week of class, and, if you choose to do this, you will need to fill out a special form and submit it to the SASHP or the Honors College (as applicable). Honors students are expected to complete all of the aforementioned assignments associated with this course, in addition to two other components:

**Getting Started - Choosing a Topic**

You will have the opportunity to choose three topics that interest you related to STEM education. You should pick topics that you are interested in. Two students may not choose the same topic, so it is best to have a back-up plan or two. Students may choose an extension of any topic that will be discussed in class, or, with the instructor’s permission, a different topic that they may have heard about or come across.

**Literature Review**

You will write a brief literature review that includes an analysis of the current literature on your topic. The paper should be approximately 5-8 pages, with citations and references. You will meet with me, your instructor, at least one time to discuss your progress on the literature review. You can request to meet with me at any time during the semester to talk about your topic, sources, and the report itself.

**Design and Facilitation of Workshop for TIs**

At the conclusion of the course, you will design and facilitate a short workshop on your topic to fellow TIs during a weekly TI meeting. The workshop can be designed in any manner that you choose, but it should include some component of active learning for the participating TIs. Your topic will be the same as that of the literature review proposal. The workshop should be designed to last approximately 10-15 minutes and will draw from the concepts and ideas presented within the literature review. A short Q&A session (~5 minutes) will follow the workshop. The Q&A session will include questions from the presenters to the audience and questions from the participating TIs. Each participating TI will fill out an anonymous evaluation that presenters will review as formative assessment and can keep for their own records.
Introduction to Chemistry Education (CHEM 387)
Fall 2022 Course Schedule

Class Meeting Time & Location: Fridays 2:00 PM - 3:20 PM, ARC 328 (Busch Campus)

<table>
<thead>
<tr>
<th>Instructors</th>
<th>Office</th>
<th>Office Hours</th>
<th>e-mail</th>
<th>phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary Emenike</td>
<td>ARC 316</td>
<td>by appointment</td>
<td><a href="mailto:mary.emenike@rutgers.edu">mary.emenike@rutgers.edu</a></td>
<td>848.445.1672</td>
</tr>
</tbody>
</table>

**ASSIGNMENT AND DUE DATES**

For each assignment: Your instructor will provide documents in an Assignment on Canvas for each assignment detailing instructions and providing the rubric(s) used for grading. You will want to review the rubrics along with the instructions so that you understand all the criteria being considered for each assignment.

Submission Formats: You should submit all assignments through Canvas, which ensures the student’s submission is received and recorded appropriately (in other words, emailing submissions are not in the student’s best interest in terms of record keeping!). You can submit handwritten assignments (see * in Table 1 below) on Canvas by uploading a photo or scan of your work. If you submit handwritten work that cannot be read/deciphered, it will not be graded, but you can resubmit the work within 24 hours of receiving the grade, and, if it is legible, it will be graded.

Table 1: All Class Due Dates

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
<th>Due at start of class</th>
<th>Due by Midnight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading Guides</strong>*</td>
<td>Fridays</td>
<td>1:59 pm</td>
<td></td>
</tr>
<tr>
<td><strong>Weekly Reflections</strong></td>
<td>Wednesdays</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td><strong>Goals</strong></td>
<td>Friday, September 16</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td><strong>Application, Analysis, and Extension Exercises (AAEE)</strong></td>
<td>TBD with student input</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td><strong>Submit 5 of 9 potential AAEEs</strong></td>
<td>(3 need to be designated *DIAE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>POTA (Peer Observation and Transcript Analysis)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Peer Observation (PO)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Observation Sign up</td>
<td>Wednesday, September 28</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td>- Conduct observation</td>
<td>Monday October 3 through Thursday October 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Peer observation report</td>
<td>Friday, October 21</td>
<td></td>
<td>11:59 am</td>
</tr>
<tr>
<td><strong>Transcript Analysis (TA)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Record clip</td>
<td>Monday, October 17 – Thursday, November 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Transcript</td>
<td>Friday, November 11</td>
<td>1:59 pm</td>
<td></td>
</tr>
<tr>
<td>- Peer feedback*</td>
<td>Sunday, November 13</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td><strong>Transcript Annotation &amp; POTA Reflection</strong></td>
<td>Friday, December 2</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td><strong>Teaching Philosophy Statement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Draft</td>
<td>Wednesday, November 23 (Switch Day)</td>
<td>1:59 pm</td>
<td></td>
</tr>
<tr>
<td>- Peer review*</td>
<td>Sunday, November 27</td>
<td></td>
<td>11:59 pm</td>
</tr>
<tr>
<td>- Final submission</td>
<td>Friday, December 9</td>
<td></td>
<td>11:59 pm</td>
</tr>
</tbody>
</table>

**COURSE SCHEDULE**

The schedule below provides a list of topics for the entire semester. Note that changes might be made during
the semester to accommodate for inclement weather or other unexpected occurrences. All readings and other assignments are due before coming to class. In other words, you will need to read the assigned articles/chapters by the date listed in the first column and submit your reading guide on Canvas prior to the start of class (1:59 pm). As a reminder, this is a flipped-classroom. Therefore, the majority of homework (assigned readings and reading guides) is due before class and then class time is used for discussions and activities.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1 9/09</td>
<td>Introduction to Course Social Contracting &amp; Mindset</td>
<td>No Readings</td>
</tr>
</tbody>
</table>
2. Watch Video: Stereotype Threat: A Conversation with Claude Steele; July 18, 2013  
[https://www.youtube.com/watch?v=failylROnrY](https://www.youtube.com/watch?v=failylROnrY) |
## Table 2: Honors Project Due Dates (if applicable)

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date (11:59 pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic Assignment Preference</td>
<td>Week 3 - Wednesday, September 23</td>
</tr>
<tr>
<td>Sign up for meeting with instructor (Paper)</td>
<td>Week 7 - Wednesday, October 19</td>
</tr>
<tr>
<td><strong>Meeting with instructor</strong></td>
<td><strong>October 24 – October 28</strong></td>
</tr>
<tr>
<td>Paper Outline</td>
<td>Week 7 - Friday, October 21</td>
</tr>
<tr>
<td>Draft Slides AND Paper</td>
<td>Week 9 - Friday, November 4</td>
</tr>
<tr>
<td>Sign up for meeting with instructor (Presentation)</td>
<td>Week 10 - Friday, November 11</td>
</tr>
<tr>
<td><strong>Presentation Time Preference</strong></td>
<td><strong>Week 10 - Friday, November 11 (Presentations will be Week 13 – Nov 28 – Dec 2)</strong></td>
</tr>
<tr>
<td><strong>Meeting with TI coordinator</strong></td>
<td><strong>November 14 – November 18</strong></td>
</tr>
<tr>
<td>Final Paper Submission</td>
<td>Week 13 - Sunday, November 27</td>
</tr>
<tr>
<td>Final Presentation Submission</td>
<td>The night before (11:59 pm) your presentation at the TI Staff Meeting. The date and time will be determined based on preference and availability</td>
</tr>
</tbody>
</table>