Why Chemistry Matters
Quest 2 Syllabus

Primary General Education Designation: Physical Sciences

Secondary General Education Designation: Diversity

July 1st, 2022-August 9th

Holidays: 7/4

Reading Days: --.

I. Course Information

Quest 2 IDS2935-Why Chemistry Matters (Class #18899-19804)

Summer B 2024

Meeting MWF: 3 (11:00 AM – 12:15)

Location: TUR L005

T/R Period 3(top row; 11:00 AM – 12:15) or 4 (bottom row; 12:30-1:45) breakout sessions:

18899 LEI 104	18901 TUR 1105	18903 LIT 0219
18900 LEI 104	18902 TUR 1101	18904 FL 0127

General Education Designation: [Physical Sciences, Diversity]

* A minimum grade of C is required for general education credit

This class is scheduled as a face-to-face course.

Instructor

Gail E Fanucci – fanucci@chem.ufl.edu ; and Canvas email

Office location: 311F Chemistry Lab Building (CLB)

Office hours: Wed 3-4 pm over Zoom (and by appointment)

Phone: (352) 392-2345 (office)

Teaching Assistants : Alle Wolfer, Tina Li, Mahsa Moshari

contact and office hours TBD – see Canvas

Course Description

This cross-disciplinary Quest 2 course examines "Why Chemistry Matters" through analysis and discussion of topics (e.g. agriculture, materials, energy, medicine, human health, nature and the environment) represented in two popular public-facing science novels "The Disappearing Spoon" and "Napoleon's Buttons" – all focused-on aspects of chemical innovations used to tackle problems in society in the past. The course extends these examples to social and political problems of today and the future; asking "How can novel approaches/innovations in chemistry help alleviate or answer current and arising challenges in our world today, such as our food supply and pollution, novel medicines to combat resistance and addiction, and our water supply and the built environment?", and "How has chemical innovation been motivated by and impacted diverse groups of people?" The answers to these questions will also reveal to students how pervasive chemistry is in their daily lives. One can say, "It is everywhere!"

Typically, the first session of each module will be used to explain the chemical concepts and principals required to have a deep understanding of the processes and products that humans have used in diverse groups of people throughout history related to that module's topic (medicine, toxins, pollution, weapons, dyes, sugars, radioactivity, soaps etc). The chemical concepts presented span across general/physical/inorganic/organic/nuclear/biochemistry. An overarching theme throughout the semester is the isolation, characterization or creation of atoms/molecules required for life, extending to those that impact our quality of life. Examples include primary metabolites (sugars, proteins, lipids) and secondary metabolites (toxins and medicines), as well as energy and processes needed for a modern society (such as agriculture and water quality, dyes, chemical weapons, bombs and controlled chemical explosions for infrastructure). Hence, demonstrating how chemistry is "everywhere".

Typically, the second component of each module emphasizes the social context of chemistry in the particular applications being examined that week, with emphasis placed upon how scientific developments arise from or impact diverse societies or groups of people (e.g. health disparities, dual-use technologies and regulations, indigenous medicine versus modern pharmaceuticals, gender identity, gender and color, contagion panic and ethnicity/social class, cleanliness and race, set and setting related to drug abuse). Guest lecturers from various non-STEM departments have helped to develop course content and some may be available to participate with the lectures and lead/develop in-class activities that emphasize the merging of chemistry and society, with emphasis on how diversity motivated some chemical innovations and how chemical developments inadvertently effect diverse groups of people.

Typically, the third component of each module involves an experiential learning activity; e.g. in class activities, discussions and reflections, lab demonstrations, laboratory experiments, tours of facilities on UF campus (e.g. Ethnobiology gardens, AMRIS facility) or workshop activities to help develop student skills for their public-facing writing pitch assignment. These sessions will be facilitated by TAs during the summer semester.

Regarding assignments there typically will be a quiz each for each module (MC, T/F, short answers) to assess that students have read/watched the assigned materials and to demonstrate SLOs related to content for chemical and social concepts. For most modules there will also be a discussion post to meet the critical thinking, communication and connection SLOs for Quest 2, Gen Ed-P and Gen Ed-D. Exams will be delivered

intake home essay and short answer format, and exams will be designed to meet the merging concept SLOs for Quest 2. In class activities (depending on student enrollment can be group or individual) and the corresponding assignments will be designed to assess reflection and data analysis aspects of SLOs.

This course is expected to be of interest to STEM majors who wish to seek a deeper understanding of how "*what we do*" is motivated by and impacts social aspects, including diversity, in our lives. By describing and analyzing how chemical innovations and the scientific method arise from or have impacted various societal groups within the United States and across the globe, sessions 2 and 3 each week; along with their corresponding assignments and assessments, this course will meet the SLOs for Diversity. This course will also appeal to non-STEM majors who seek to have a deeper understanding of where and how chemistry is essential to their daily lives and impacts life's perceived quality. The SLO requirements for the Physical Sciences will be met by activities of sessions 1 and 3 of each module (along with corresponding assignments), where descriptions of chemical concepts and analysis of experimental methods and results will be performed.

It is not required that you have any college level science course as a prerequisite for this course as the chemistry and scientific concepts within Disappearing Spoon and Napoleon's Buttons will be addressed. High-school level understanding of chemistry/physics is expected.

Required & Recommended Course Materials (to purchase/rent)

- *"The Disappearing Spoon and Other Extraordinary True Tales from The Periodic Table"* Sam Kean
- *"Napoleon's Buttons: How 17 Molecules Changed History"* Penny Le Couteur and Jay Burreson
- *Other reading content will be provided on Canvas*

Statement on Materials and Supplies Fees

There are no extra fees for this class

II. Coursework & Schedule

1. List of Graded Work

Work	Description	Percentage
On-line discussions	Almost all modules will have an on-line discussion that evaluates critical thinking and reflective components of the integration of the chemical and social concepts of that module. Most of these will be performed as group activities.	25
Exams	There will be two exams that assess your knowledge, comprehension, and evaluation of course materials. This semester these will be on-line/take home.	25
In-class activities ad experiential Learning Activities	For each module there will be either an in-class activity or an experiential learning activity (most will be group activities depending upon enrollment) that you will do during either on your own time and class isn't scheduled or during the period that will involve analysis, synthesis and evaluation of presented materials. Please check on Canvas for due dates and times. [tours, demos, experiments, data analysis, reflections]	20
Participation	You are expected to come prepared for lecture/seminar presentations /activities/ workshops and to be fully engaged and participating in the Friday activities. There are some activities that are graded that are participation (like introduction to groups etc.)	10
Public-Facing Pitch	In efforts to engage with the public on Chemistry Issues that impact society, you will compose a pitch to an editor for a public-facing chemistry article of a topic of interest to you that relates to a current or future social challenge where chemistry can impact. Two course periods are set aside for development of your pitch topic and a workshop to help develop your pitch. There are various assignments and feedback leading to the final percentage of your grade.	20

Schedule for Summer B 2024

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1 7/1-5	Class Intro/ Pitch Description /Examining Chemical Explosions	Explosion and Combustion Demos	History of Explosions	HOLIDAY	Examining Chemical Fertilizers Fertilizer to Chemical Warfare/ Phosphorus Cycle and Organic Farming
2 7/8-12	Free-Lance Writing Library Resources Activities 1 (schedule with science librarian	Evaluating Organic Fertilizers and Run-off Nitrogen and Phosphorus Pollution	How old is our Planet? Why was Lead removed from Gasoline?	Political Lobbying and re-framing social issues to appeal to emotion Lobby Activity	Elements of WWII and the Cold War/ Philosophy of Dual Use technology
3 7/15-19	Intro to Organic Chemistry/ Spices and Trade,	Garden Tours Activities	Dyes, Pigments and the Chemical Industry	Prussian Blue/Cyanotype Demos	Cultural Attitudes and the Meaning of Color
4 7/22-26	Sugars as Food, Clothing and Medicine	Social Inequalities of our Food/Discuss Food Journal Activities	Exam Time 1 On-line	Pitch Workshop	Germ Theory and Antibiotic Resistance/ Cholera and Contagion Panic
5 7/29-8/2	History of Pain Medicine	What's in that? Analysis of cleaning products	Pick your poison/Drugs vs Medicine	What is a Drug Addict? Opioid epidemic	What is a salt? / Urban Planning
6 8/5-9	Soaps and Coatings /Cleanliness, Advertising and Racism	Coatings Exp./	Pitch Due Olive Oil Tasting	Exam 2 (On-line)	

III. Grading

3. Details for grading expectations

a. Attendance and Participation:

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Attendance: will be noted and recorded in the Canvas gradebook. You are allowed two "unexcused absences" for the semester, after which each absence that does not meet university criteria for "excused" will result in a two percent deduction from your participation grade. However, unexcused absences on group/inclass activities will automatically result in a score of zero for participation/assignment if we are doing an activity.

Participation (10% total grade): Consistent informed, thoughtful, and considerate class participation during breakout sessions is expected and will be evaluated using the rubric below. The TAs will post your participation grade to date in Canvas when Exam 1 results and schedule a conference if you are earning below 70% of the possible points. There are also graded activities and discussion posts that contribute to your participation grade.

NOTE: If you have personal issues that prohibit you from joining freely in class discussion, e.g., shyness, language barriers, etc., see the instructor as soon as possible to discuss alternative modes of participation.

General Participation Grading Rubric:

	High Quality	Average	Needs Improvement	Unacceptable
Informed: Shows evidence of having done the assigned reading and in-class work.	100 pts	80 pts	50 pts	0 pts
Thoughtful: Shows evidence of having understood and considered issues raised.	100 pts	80 pts	50 pts	0 pts
Considerate: Takes the perspective others into account.	100 pts	80 pts	50 pts	0 pts

Instructor/TA will note your participation each week giving general scores of high quality, average, needs improvement or unacceptable. The percentages will be recorded in Canvas as two separate assignments and will be averaged to total 5% of your final grade.

b. Discussion Posts (25% total grade):

Approximately each week there will be an on-line discussion in Canvas that evaluates critical thinking and reflective components related to the integration of the chemical and social concepts of that module. Students will be either given (1) additional information to read and asked questions related to self-reflection or (2) asked to identify, describe, discuss and provide references to a current political or societal situation that is analogous to the lessons of that week. Discussion posts will be graded based upon how well students provide responses that are informed, thoughtful, reflective and complete. Discussion post length will typically involve 4-5 paragraphs of response.

General Discussion Grading Rubric:

	High Quality	Average	Needs Improvement	Unacceptable
Informed: Shows evidence of having done the assigned reading and in-class work.	100 %	75 %	50 %	0 %
Thoughtful: Shows evidence of having understood and considered issues raised.	100 %	75 %	50 %	0 %
Reflective: Provides a component of self-reflection that is sincere.	100 %	75 %	50 %	0 %
Complete: Responses are complete and/or consistent with the instructions. Responses also utilize appropriate grammar	100 %	75 %	50 %	0 %

c. In-Class Activities (20% total grade):

Almost every week there will be an in-class activity or tour that will have a graded assessment that may contain the following: (A) questions with short answers to assess the content of the demonstration/tour etc, (B) short responses asking students to reflect on how integration of concepts in the module impacts or alters their views on that week's topic (graded with a scale similar to reflective component of discussion posts), or (C) possible problems to be solved or data to be analyzed. Grading of problem sets/data analysis/short answers will evaluate completeness and correctness according to the percentages of 100%=high quality, 75% = average quality, 50% = needs improvement, 0% =unacceptable.

d. Public Facing Pitch and related assignments (20% total grade):

There are four graded assessments related to the pitch development and submission.

A) The first of these is an on-line assignment that will introduce you to select public-facing essays from Rebecca Altman such as "Object Lessons" in *The Atlantic* and essays from *Aeon Magazine*. An important aspect of writing a pitch is having appropriate references and you will be given the source documents for the essays. This assignment will also expose you to the resource "OpenNotebook.com", showing you various components to develop a pitch to an editor. After digesting the reading material, students will post in the Pitch Discussion Post three questions they would like to ask Rebecca (or another public facing science writer). This assignment will be due prior to the in-class interview with either Rebecca Altman or Dr. Sean Trainer. Grading will be done in accordance with the rubric for Discussion Posts described above. During the In-class interview, students will be evaluated based upon their participation.

B) The second component to the pitch assignment will be students reporting in The Pitch Ideas and References on-line Discussion Post their identified topic for the pitch and 5 sources. This documentation will be reviewed and feedback will be given. Grading will be done to in accordance with the rubric for Discussion Posts described above.

C) The third component is the development of the pitch. Prior to the due date, we will have another in-class workshop (a Friday activity) where students will be asked to participate and share the development of their pitch and to provide peer evaluations/discussion regarding how well it is meeting the guidelines provided by Dr. Sean Trainor. This assignment will be graded according to the Participation rubric provided above as well as students turning in written answers to the 7 concepts given in the guide to writing a pitch after obtaining peer review feedback. Students are expected to have active participation and give feedback to other students/groups. This activity may vary depending upon class size as groups of 5 students should be set to help facilitate the effective communication and feedback among the group. The written document will be reviewed by Faculty/TA and feedback will be given. The written document will be graded according to rubrics for correctness and completeness given above.

D) The final and last component is the grading of the pitch. Pitches will be submitted on-line. Students will be asked to peer review TWO other pitches addressing how well the pitch matched the guidelines given by Dr. Trainer. The final grade will be the average of the faculty/TA grading and TWO peer reviews. Each of the pitches will be evaluated based upon the 7 concepts outlined in the guide to writing a pitch along with evaluating grammar and organization. Scores for these 9 criteria will range from of 100%, 85%, 70%, 50%, 0%; reflective of excellent, very good, average, below average and unacceptable; respectively.

4. Grading Scale

For information on how UF assigns grade points, visit: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

A	≥94 – 100% of possible points		C	≥75 – 80%
A-	≥90 – 94%		C-	≥70 – 75%
B+	≥86 – 90%		D+	≥65 – 70%
B	≥83 – 86%		D	≥60 – 65%
B-	≥80 – 83%		F	<60

I will round to the appropriate unit percentage.

IV. Quest Learning Experiences

5. Course Delivery and Engagement

This course has traditional lecture periods (MWF) to examine the chemistry concepts of the modules. The Tuesday and Thursday breakout sessions with TAs are designed to be engaging and encourage participation and group activities.

6. Details of Experiential Learning Component

Chemical Demonstrations and Experiments Include:

- Explosive Molecules and Reactions
- Making and Evaluating Dyes
- Seek and Find in Botanical Gardens
- Superhydrophobic Coatings

7. Details of Self-Reflection Component

Throughout the semester, the on-line Discussion Posts and Post-lab/tour assignments will contain a reflective component where you evaluate your views on a topic pre- and post- module interactions. For example, you may be asked to describe and evaluate your biases/views on essential oils as medicines prior to and after grappling with the week's module content and activities.

8. What is the essential/pressing question your course explores?

This course shows how Chemistry and Society are intertwined; how societal needs motivate chemical innovation and how chemical innovation impacts our lives in a multitude of ways, making Chemistry and chemical innovation present "everywhere". This course also explores why "Chemistry" as a field sometimes has a negative public relations view through the dual-use aspect of many chemical innovations that can be utilized for benefit – or harm; intended or unintended. This course aims to broaden the social consciousness of STEM majors to get a deeper understanding of where Chemistry is involved in our daily lives, as well as

how chemical innovation is motivated by and impacts social disparities. This course will also provide a basic General Education of chemical concepts and principles within our everyday lives; thus educating non-STEM majors on how it is impossible to separate chemistry from our social world- past present and future.

V. Required Policies

9. Students Requiring Accommodation

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://disability.ufl.edu/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

10. UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

11. University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

12. Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

13. The Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 2215 Turlington Hall for one-on-one consultations and workshops.