FLORIDA POLYTECHNIC UNIVERSITY

Syllabus: CHM 2045 Chemistry 1

Fall 2024

Welcome to Chemistry 1! This course is part of the **STEM Core**, a set of critical and foundational courses consisting of mathematics, chemistry, physics, programming, and STEM applications. These courses build the skills and conceptual understanding you need to succeed in all degree programs. Data show that completing these courses in your freshman (first) year is the best path towards a high-powered STEM degree and an on-time graduation. Courses in the STEM Core share similar formats and expectations. The faculty across the STEM Core work together to help you succeed. Make these courses a priority!

Academic Integrity: Students are expected to adhere to the highest standards of academic integrity. Violations of academic integrity, particularly cheating and plagiarism, undermine the central mission of the university and negatively impact the value of Florida Poly degrees. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student. More information about Florida Poly's academic integrity policies and procedures can be found here: https://floridapoly.edu/wp-content/uploads/2017/07/FPU-5.005-Academic-Integrity-7.29.14.pdf#search=academic%20integrity

Course Information

- **Course Number and Title**: CHM 2045 Chemistry 1
- **Credit Hours:** 3 credit hours
- **Academic Term:** Fall 2024

Instructor Information

- **Instructor:** Dr. Tracy Olin
- **Office Location:** BARC 2262
- **Office Hours**: In-person MWF 11:00 am -12:00 pm or by appointment
- **Email address**: tolin@floridapoly.edu

Course Delivery and Course Description

- **Delivery Mode**: This course will be held face-to-face (in-person) at the rooms and times given below.

  Section 1: IST-1068 MWF 8:00 am – 8:50 am
  Section 2: IST-1068 MWF 9:00 am – 9:50 am
  Section 3: IST-1067 MWF 9:00 am – 9:50 am
  Section 4: IST-1068 MWF 10:00 am – 10:50 am
  Section 5: IST-1068 MWF 11:00 am – 11:50 am
  Section 6: IST-1067 MWF 2:00 pm – 2:50 pm
  Section 7: BARC-1123 MWF 2:00 pm – 2:50 pm
  Section 8: IST-1014 MWF 3:00 pm – 3:50 pm
  Section 9: IST-1045 MWF 3:00 pm – 3:50 pm

- **Official Catalog Course Description**: This course is designed for students pursuing careers in the sciences or who need a more rigorous presentation of chemical concepts than is offered in an introductory course. Students will engage in problem solving and critical thinking while applying chemical concepts. Topics will include the principles of chemistry including atomic theory, electronic and molecular structure, measurement, stoichiometry, bonding, periodicity, thermochemistry, nomenclature, solutions, and the properties of gases.
    - **Course Pre-Requisites:** N/A
    - **Course Co-Requisites**: CHM 2045L – Chemistry 1 Laboratory
    - **Communication/Computation Skills Requirement (6A-10.030)**: No

- **Required Texts and Materials:**
    - Brown, T.E.; LeMay, H.E.; Bursten, B.E.; Murphy, C.; Woodward, P.; Stoltzfus, M.E. Chemistry: The Central Science (15th edition); Pearson: New York, NY. ISBN: 9780137542970
    - All STEM Core courses will require the **Texas Instruments TI-30XIIS calculator** or a very similar calculator (must be approved by instructor). No other type of calculator is allowed on exams. It is advised that you obtain this calculator and become familiar with it prior to the first exam. It is also strongly recommended that you bring it to class daily, as there may be in-class work that requires the use of a calculator.
    - Access to the course Canvas LMS website. Course resources will be posted here, including any course announcements, changes in the syllabus, etc. The Homework will also be through the Canvas website.
    - Access to the University Email System.

- **Communication**: Florida Polytechnic University email is the official method of communication for the University. Students are required to check their email frequently. The subject of your emails must start with "CHM 2045 Section X" followed by the topic. Failure to provide the correct subject, may result in ignoring the email or delayed response. Any email received from an address other than the one with the floridapoly.edu domain will not be replied to. Emails will typically be answered within 24-48 hours, Monday-Friday.

Course Objectives and Outcomes

- **Student Learning Outcomes:**
    - Students will apply the law of conservation of matter and energy.
    - Students will implement rules of significant numbers to all measurements.
    - Students will explain the fundamental properties of matter including but not limited to atomic and electronic structure, and periodicity.
    - Students will apply IUPAC rules of nomenclature.
    - Students will predict molecular geometry and properties from bonding theories
    - Students will predict and explain the products of chemical reactions (e.g., acid-base, oxidation-reduction, precipitation, dissociation).

- **Alignment with Program Outcomes**:
    - This course supports General Education competency for scientific reasoning. Program Learning Outcomes and General Education Competencies may be found in the Academic Catalog (http://catalog.floridapoly.edu/). Additionally, outcomes may be aligned with level of difficulty per Bloom's taxonomy (see University's Institutional Effectiveness Manual for Academic programs).

Course Learning Outcome	**Learning Level** (e.g. Bloom's, Anderson/ Krathwohl; Rogers Hatfield (ABET Assessment Example)	**Program Learning Outcome (ABET, GenEd, Other)**
Learning and exploring chemistry via critical thinking based on Socio-Chemistry (problem-oriented approach to chemistry teaching)	Understand Categorizing Predicting Compare and contrast	1-a
Exploring chemistry as engineering based on mathematical approach and applications	Apply Implementing	1-e, 1-k
Ability explore chemistry in application aspects for example, Redox chemistry, Thermal energy changes involved, etc.	Analyze Differentiating Classifying Identifying	2-c, 2-k
Ability to discuss chemistry, understanding of theories in the manner of a problem solving approach	Evaluate Predict Judging	3-g, 4-f, and 5-d
Applying knowledge of lectures in laboratory experiments	Create Hypothesizing Coordinating	6-b, 7-i
Introducing analytical aspects in lectures to understand examples	Application	6-k
Motivating students for upper-level courses, advanced training, and growing up as a scientist		5-d, 7-i

Course Schedule: Tentative Weekly Schedule:

Week	Topics	Chapter/Sections
Week 1 8/20 – 8/23	Syllabus, **Concepts of matter**: Basic definitions, measurements and units, uncertainty and significant figures.	Ch 1.1-1.3, 1.5-1.6
Week 2 8/26 – 8/30	Problem-Solving- Dimensional analysis, **Atoms and Elements**: Atomic theories, structure of atom, atomic symbols, isotopes, average atomic mass, the periodic table.	Ch 1.7 2.1-2.5
9/2	**Labor Day – NO CLASSES**	
Week 3 9/3 – 9/6	**Molecules and Compounds**: ions and Ionic formulas, polyatomic ions, **Naming compounds**.	2.6-2.9 **HW #1 due 1/22**
Week 4 9/9 – 9/13	**Chemical Reactions and Chemical Quantities**: Balancing chemical equations, types of chemical reactions, formula weights, the mole concept	3.1-3.4 **HW #2 due 1/29**
Week 5 9/16 – 9/20	Molar mass, percent composition, Empirical formulas. **Stoichiometry**: Limiting reactant and reaction yields. **Midterm #1 – TBD – will be a common exam**	3.4-3.7 **HW #3 due 2/5**
Week 6 9/23 – 9/27	**Introduction to Aqueous Reactions:** precipitation reactions, solubility rules, net ionic equations, Acid-Base reactions, neutralization, titrations, oxidation-reduction reactions, activity series.	4.1-4.4 **HW #4 due 2/12**
Week 7 9/30 – 10/4	**Aqueous solutions**: Conductivity, molarity and solution concentrations, dilution, titrations. **Properties of gases:** gas laws, ideal gas law	4.5-4.6 10.1-10.3 **HW #5 due 2/19**
Week 8 10/7 – 10/11	Gas mixtures/partial pressures, Kinetic-Molecular theory, diffusion, **Thermochemistry**: Energy, heat transfers, quantifying Heat and Work, Enthalpy	10.4-10.6 5.1-5.3 **HW #6 due 2/26**
Week 9 10/14 – 10/18	Heat capacity/specific heat, Calorimetry-measuring ΔH_{rxn}, Hess's law, Standard Enthalpies of Formation, bond enthalpies, Intro to **Quantum Mechanical Model of the Atom** **Midterm #2 – TBD – will be a common exam**	5.4-5.8 6.1 **HW #7 due 3/11**
Week 10 10/21 – 10/25	EM radiation, frequency and wavelength, Photoelectric effect, Atomic emission, line spectra Bohr model, Uncertainty principle, atomic orbitals	6.1-6.7 **HW #8 due 3/18**
Week 11 10/28 – 11/1	Electronic structure of atoms, quantum numbers and electron configurations, **Periodic Properties of the Elements**: effective nuclear charge	6.8-6.9 7.1-7.2 **HW #9 due 3/25**
Week 12 11/4 – 11/8	**Periodic trends:** atomic size, ionization energy and electron affinity, electronegativity **Chemical Bonding I** -The Lewis Model: The octet rule, Ionic bonding, covalent bonding	7.3-7.4 8.1-8.3 **HW #10 due 4/1**
11/11	**Veteran's Day – NO CLASSES**	
Week 13 11/12 – 11/15	Electronegativity, Bond polarity, Lewis symbols, Formal charge, Resonance structures **Midterm #3 – will be a common exam**	8.4-8.7 **HW #11 due 4/8**
Week 14 11/18 – 11/22	Octet exceptions, bond strengths and bond lengths, **VSPER model** - effect of lone pairs, Molecular polarity **Chemical Bonding II:** covalent bonding/orbital overlap,	8.7-8.8 9.1-9.4 **HW #12 due 4/15**
Week 15 11/25	Hybrid orbitals, hybridization	9.5-9.6 **HW #13 due 4/22**
11/27 – 11/29	**Thanksgiving Break – NO CLASSES**	
Week 16 12/2 – 12/4	MO theory and molecular orbitals (if time permits) and final review	9.7-9.8
FINAL EXAMS	**S, M-Th (Dec 7, 9-12)**	

Course Policies

Please Note: Changes in this syllabus, assignments, exams dates, etc. may be modified as deemed appropriate. All changes will be announced in class and/or in Canvas Announcements.

Late Work/Make-up work

Make-up exams will be given only in extreme circumstances with a documented university-approved excuse. Any exceptions will be dealt with on a case-by-case basis. If you will miss an exam because you are participating in a college-sponsored activity, inform your instructor before the exam and provide them with documentation. See the Student Attendance Policy for more information.

Homework answer keys are posted the day after they are due, so for this reason there is no late homework accepted. The lowest homework grade will be dropped at the end of the semester, so if you happen to miss one, this will be your dropped score. You will have roughly 4-5 days to complete the homework once posted. It is strongly encouraged that students do not wait until the last possible minute to complete the assignments in case there is a technical or other issue.

Grading Scale

Grade	A	B+	B	B-	C+	C	D	F
Percentage	90%	87%	83%	80%	77%	70%	60%	< 60%
GPA	4.0	3.33	3.0	2.67	2.33	2.0	1.0	0.0

Assignment/Evaluation Methods

Assignment/Evaluation Methods:

Attendance:	5%
In-class work and participation:	5%
Homework (lowest grade dropped):	20%
Exams (three at 15% each)	45%
Final Exam	25%
Total	100%

- **Attendance:** Students in **face-to-face** courses are expected to attend all of their scheduled University classes and to satisfy all academic objectives.
    - Attendance will be taken at the beginning of each class period using A+ Attendance through Canvas. It is the student's responsibility to be sure to enter the code each lecture period. If the system is not working properly, let the professor know before or after class so your presence can be documented. Recall, attendance and participation are part of the overall grade in this course. You will lose part of the 5% attendance grade for each unexcused absence.
    - Bonus questions and/or in-class work may be given out during lecture time. If a student is absent on a day such an assignment is given, they will not be awarded any points.
    - The instructor will not repeatedly enter your attendance because you forgot to enter it. Please be sure to do this EVERY CLASS PERIOD. After 2 manual entries by the instructor, you will be counted as absent.

    - For university-approved absences (see Student Attendance Policy), it is the student's responsibility to contact the instructor promptly, or in advance when possible. Excused absences will be handled on a case-by-case basis.
    - Note: Falsifying attendance for yourself or for another student is an act of academic dishonesty and is considered a violation of the university's academic integrity policy.
    - Exceptions to any attendance requirements may be made on a case-by-case basis.

- **Participation:** Students are expected to participate in the classroom experience. In-class activities and group work may be done and will count towards part of your overall grade. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance and participation, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

- **Homework**: The weekly homework will be through Canvas and will be due each week on Monday by 11:59 pm. The assignments will open on the Thursday prior to the Monday they are due. The homework due dates are given in the weekly schedule given below. Please see the Late work policy for more information on late homework.

    - **Homework Format:** The assignments will be on Canvas. There is only one attempt for each assignment. They will consist of a mixture of multiple-choice questions and long answer/written work questions. For the written answer questions, you will need to show your work in an organized, clear way with appropriate units and significant figures and upload this to canvas under the appropriate question on the assignment. Please only upload your files as a pdf. There is a tutorial for how to do this posted on the Canvas site. In addition, if you need assistance, just ask your instructor. If you are uncertain on what is expected at any time, please ask your instructor.

- **Exams**: Midterm exam dates will be finalized early in the semester and those dates/times will be posted to our Canvas course site once available. Exam dates are subject to change and you should refer to the Academic Calendar website for the most up-to-date exam schedules for midterms and finals. Exam dates will also be announced in class and on Canvas roughly one week prior to the scheduled event. Prior to each exam, a topics list, student guide, and formula sheet will be posted on Canvas.

    - **Please note:** no electronic devices, besides an approved calculator, are permitted on exams. All cell phones and smart watches/other devices should be powered off and put away so that they are inaccessible during the exam. If a student has a phone or other smart device accessible during an exam, they will be recommended for an academic integrity investigation and will receive a zero on the exam.

- **Final Exam:** The date for the final exam will be announced once scheduled by the registrar. As with other exams, an announcement will be made with all information pertinent to the final.

Grades on Canvas

Grades will be posted to Canvas for reference only, and students should make sure they are recorded correctly. However, there is no guarantee that the percentages or projected grades provided in Canvas are correct. The instructor will calculate final percentages and will determine final grades regardless of Canvas calculations.

Grade Redemption

If a student earns a score between 50-69% on an exam, there is an option for a grade improvement plan. This plan will all students to earn points to improve their exam score. The instructor will make the announcement in class. Students may utilize this plan for only ONE midterm exam per semester (not the final).

- If you wish to dispute a score for an assignment or exam, you must describe the nature of the dispute in writing and communicate it through an email no later than one week after the due date/posting the scores of the assignment or the exam. Scores outside of this window will be considered final.

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Peer Learning Strategists (PLS)**: Are specially trained student leaders who help their peers strategize approaches to course content and work through solution methods. PLS work in collaboration with the courses they support so the content and methods are aligned with your instructors' expectations. Students can meet with a PLS in The Learning Center, which is located on the first floor of the Innovation, Science and Technology (IST) building in room 1019.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.

Civility and Collegiality

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. Communication, written, oral and behavioral, between faculty and students must remain respectful. Within and outside of the classroom, students must refrain from derogatory comments toward the faculty member and their fellow students, and faculty as well must refrain from derogatory comments toward their students. Faculty and students should address each other with respect, in accordance with the wishes of the faculty and the students: for example, no one should be addressed by their last name alone.

Faculty from the outset of a course can and should specify what constitutes activities and behavior that take away from, that diminish, the educational environment. An individual student's distracting behavior impedes the education of fellow students, which itself is a form of disrespect. Civility and collegiality also include respecting each other's time: for example, neither students nor faculty should arrive late to class (unless unforeseen, pressing circumstances prevail); faculty should be present at the posted office hours; and students and faculty should be punctual when meeting times are scheduled. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The University, through the Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and

documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations.
If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive.
If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible.

The Office of Disability Services (ODS):
DisabilityServices@floridapoly.edu
(863) 874-8770
The Access Point
ODS website: www.floridapoly.edy/disability

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discussion resources and options available.

Academic Integrity

The faculty and administration take academic integrity very seriously. Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in an academic integrity hearing and sanctions against the accused student if found in violation. Sanctions range from receiving a zero on the exam or assignment, to expulsion from the university. Repeat offenders are subject to more severe sanctions and penalties.
Any "special" instructions that are appropriate for academic integrity and the course should go here.
(It is essential that a heading and a statement on what constitutes, includes, academic integrity be included in the syllabus, and that the students be made aware of academic integrity at the beginning of a course.)

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidently, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action).

Recording class activities other than class lectures, including but not limited to lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is ***prohibited****.*