Chem S101: Chemistry in Context (TENTATIVE)
Summer 2025

Course Description: This course explores the fundamentals of chemistry through real-world applications, beginning with the principles of atoms and molecules and examining how molecular structure determines their function. Topics will range from materials, pharmaceuticals, art, and cooking to laundry detergents. This course aims to encourage students of all backgrounds and academic interests to become knowledgeable, scientifically literate thinkers who approach scientific topics critically and are committed to lifelong learning. This course is intended for non-science majors who have limited to no previous chemistry knowledge. The course is not open to students who have completed another chemistry course at Yale, nor does this course satisfy premedical chemistry requirements or requirements for the chemistry major.

Lectures: M-Th 9:30-11:15 am SCL tbd (in-person, mandatory)
Office hours: M-Th 11:15-12:00pm SCL tbd (or schedule via email)
Instructor: Dr. Ruth Son, ruth.son@yale.edu

Attendance: All lectures will be held in person in SCL TBD and feature live demonstrations, in-class problem-solving, and active discussion. Attendance at all lectures is required during the Yale Summer Session.

Grades:

Homework (90 pts): Problem sets are due via Canvas by 11:59 pm. No lates accepted.
Exams (250 pts): The lowest of 3 exams will be worth 50 pts, the remainder 100 pts each.
Presentation (160 pts): Proposal (40 pts), Update (40 pts), Final (80 pts)

Student Accessibility Services: Students who require accommodations should work with Student Accessibility Services (sas@yale.edu) and forward their SAS letter to the instructor by the first day of class.

Academic Honesty: Students are encouraged to collaborate on homework assignments, but each student must submit their own individual work. During exams, students are required to work independently.

Course Materials (optional): No textbooks or materials are required for this course. All necessary resources will be provided on Canvas. The following textbooks are optional and recommended for those who wish to explore topics in more depth:

Organic model kit
Chemistry: The Science in Context (6th ed.) by Gilbert et al.
Chemistry in Context (10th ed.) by The American Chemical Society
Organic Chemistry (7th ed.) by Loudon and Parise
Napoleon's Buttons: 17 molecules that changed history by Couteur and Burreson
Chemistry for Changing Times by Hill and McCreary (open source: link)
Artists' Pigments: A Handbook of Their History and Characteristics by Feller
What Einstein Told His Cook by Wolke

Provisional Syllabus Chem S101

Schedule (TENTATIVE):

L#	Date	Topics	Due
1	(M) 6/30	**Introduction to the Course & Chemistry** *Atoms, elements of the periodic table, electronegativity* Activity: Discover elements around SCL	
2	(Tu) 7/1	**2D: Chemical Bonds & Molecular Structures** *Ionic and covalent bonds; Lewis structures; physical properties, olive oil vs. butter* Activity: TBD	
3	(W) 7/2	**3D: Molecular Geometry & Stereochemistry** *Enantiomers, chirality, and scents; the story of thalidomide* Activity: building models	HW 1 due (L.1-3)
4	(Th) 7/3	**Functional Groups, Chemical Reactions, Acids & Bases** *Functional groups; acids and bases; antacids and heartburn; baking; water-soluble vitamins* Activity: red cabbage indicator	
5	(M) 7/7	**Alkanes, Alkenes, Alkynes** *Structure & reactivity; climate change; carbocations, terpenes, and steroids* Activity: ethylene as a fruit ripener	Presentation Proposal
6	(Tu) 7/8	**Chemistry @ Yale University Art Gallery** *Meet at YUAG, 1111 Chapel St New Haven*	HW 2 due (L.4-5)
7	(W) 7/9	**Exam 1 (Lectures 1-6)**	
8	(Th) 7/10	**Alkenes, Dienes** *Structure & reactivity; polymers, discovery of Teflon, and recycling; color and dyes* Activity: plastic bags vs. Ziploc bags	
9	(M) 7/14	**Epoxides, Aromaticity** *Structure & reactivity; polyaromatic hydrocarbons, nicotine, and cancer* Activity: TBD	
10	(Tu) 7/15	**Alcohols** *Structure & reactivity; oxidation reactions, breathalyzers, and biological oxidation of ethanol* Activity: TBD	HW 3 due (L.8-10)
11	(W) 7/16	**Phenols** *Structure & reactivity; radical inhibitors, antioxidants, and food additives; acetaminophen* Activity: TBD	
12	(Th) 7/17	**Alkyl Halides** *Structure & reactivity; radicals and ozone layer; DDT and pesticides*	Presentation Update

		Activity: TBD	

13	(M) 7/21	**Chemistry @ Yale Farm** *Meet at Yale Farm, 345 Edwards St New Haven*	HW 4 due (L.11-12)
14	(Tu) 7/22	**Exam 2 (Lectures 8-13)**	
15	(W) 7/23	**Aldehydes, Ketones** *Structure & reactivity; reduction reactions; exercise and muscle burn; beta-Carotene in carrots and vision* Activity: TBD	
16	(Th) 7/24	**Carboxylic Acids** *Structure & reactivity; soap and detergent; decarboxylation, soda and winemaking* Activity: fermentation balloon experiment	HW 5 due (L.15-16)

17	(M) 7/28	**Esters, Amides** *Structure & reactivity; the story of aspirin and opioids; penicillin and antibiotics* Activity: TBD	
18	(Tu) 7/29	**Amines** *Structure & reactivity; basicity; food preservatives; airbags* Activity: TBD	HW 6 due (L.17-18)
19	(W) 7/30	**Final Presentations**	
20	(Th) 7/31	**Exam 3 (Lectures 15-19)**	

- (W) 7/16 Withdraw w/o appearing on transcript
- (F) 8/1 Convert letter grade to Credit/D/Fail or withdraw