CHEM 210 – ORGANIC CHEMISTRY | 4 CREDITS (3+3P)

SYLLABUS

CATALOG DESCRIPTION

A one semester survey for students requiring a brief coverage of important classes of organic compounds and their application to biology. Coverage includes nomenclature, preparation, chemical transformation of functional groups, reaction mechanisms, carbohydrates, proteins, DNA, and metabolic reactions.

Prerequisites: CHEM 110 or CHEM 112

Semester Offered: On Demand

Common Student Learning Outcomes

Upon successful completion of San Juan College programs and degrees, the student will demonstrate competency in…

BROAD AND SPECIALIZED LEARNING

Students will actively and independently acquire, apply, and adapt skills and knowledge with an awareness of global contexts.

CRITICAL THINKING

Students will think analytically and creatively to explore ideas, make connections, draw conclusions and solve problems.

CULTURAL AND CIVIC ENGAGEMENT

Students will act purposefully, reflectively, and ethically in diverse and complex environments.

EFFECTIVE COMMUNICATION

Students will exchange ideas and information with clarity in multiple contexts.

INFORMATION LITERACY

Students will be able to recognize when information is needed and have the ability to locate, evaluate, and use it effectively.

INTEGRATING TECHNOLOGIES

Students will demonstrate fluency in the application and use of technologies in multiple contexts.

Student work from this class may be randomly selected and used anonymously for assessment of course, program, and/or institutional learning outcomes. For more information, please refer to the Dean of the appropriate School.

Course Learning Outcomes

Upon successful completion of the course, the student will be able to…

1. Draw resonance structures and use them to predict stabilities of radicals and ions.
2. Identify nucleophiles and electrophiles, and predict Lewis acid-base reactions.
3. Determine the hybridization and geometry of atoms in molecules.
4. Describe sigma and pi bonding in terms of orbital overlap.
5. Determine the polarity of bonds and molecules based on 3 D structure.
6. Name and draw simple alkanes, alkenes, and alkynes
7. Compare the energies of alkane conformations and predict the most stable conformations.
8. Predict the products and explain the mechanism of the free-radical halogenation of alkanes.
9. Predict the products and explain the mechanism of addition reactions of alkenes and alkynes.

10. Predict the products and explain the mechanism of elimination reactions to form alkenes and alkynes.
11. Name and draw aromatic compounds.
12. Predict the products and explain the mechanism of electrophillic aromatic substitution.
13. Predict the products and explain the mechanism of Friedel-Crafts Alkylation and Acylation.
14. Predict the products of SN1, SN2, E1, and E2 reactions including stereochemistry.
15. Classify molecules as chiral or achiral, and identify mirror planes of symmetry.
16. Identify enantiomers, diastereomers, and meso compounds.
17. Name and draw simple alcohols, ethers, aldehydes, ketones, and carboxylic acids
18. Describe how alcohols, ethers, aldehydes, ketones, and carboxylic acids are synthesized.
19. Show the mechanism of the ring opening of epoxides.
20. Predict the products and show the mechanism of nucleophilic additions to carbonyls.
21. Predict the products and show the mechanism for nucleophilic acyl substitution.
22. Describe Keto-Enol Tautomerism.
23. Predict the products and explain the mechanism of carbonyl condensation reactions.
24. Name and draw amines.
25. Describe the synthesis and reactions of amines.
26. Identify and describe heterocyclic amines.
27. Describe the configuration of monosaccharides and aldoses using Fisher Projections.
28. Show the mechanism of hemiacetal formation.
29. Describe the structure of disaccharides and polysaccharides.
30. Name and draw amino acids and peptides, and polypeptides.
31. Determine peptide structure from amino acid analysis.
32. Show how peptides can be synthesized.
33. Define levels of protein structure.
34. Identify lipids and nucleic acids
35. Describe the structure of DNA
36. Use organic reagents for quantitative analysis in the laboratory.
37. Synthesize and investigate organic reactions in the laboratory.
38. Apply chemical and physical tests to identify organic compounds.
39. Identify key components and principles of operation of a gas chromatograph.
40. Use gas chromatography to separate and identify components of a mixture.
41. Describe how a mass spectrometer works.
42. Use the fragmentation pattern of a mass spectrum to determine structure.
43. Describe how an infrared spectrophotometer works.
44. Given an IR spectrum, identify functional groups.