CHEM 252 – ORGANIC CHEMISTRY II | 4 CREDITS (3+3P)

SYLLABUS

CATALOG DESCRIPTION

Part two of the study of carbon compound chemistry covering: structure and reaction mechanisms of carboxyl, amine, conjugated, and polyfunctional systems; ultraviolet spectroscopy; biochemistry; and synthetic polymers.

Prerequisites: CHEM 251 or equivalent

Semester Offered: Spring

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. Propose Williamson ether synthesis of ethers.
2. Show the mechanisms of acid catalyzed and base catalyzed ring opening of epoxides.
3. Show the mechanism of epoxidation and acid catalyzed ring opening and cyclization related to the biosynthesis of steroids.
4. Show the mechanism of the formation of epoxy ether based polymers.
5. Construct molecular orbitals and electronic configurations of conjugated systems.
6. Predict the products of Diels-Alder reactions.
7. Use HOMO-LUMO interactions to predict thermal or photochemical cycloadditions.
8. Predict UV absorption maxima of conjugated systems.
9. Construct and interpret molecular orbitals and electronic configurations of aromatics.

10. Use the polygon rule on conjugated cyclic systems to determine aromaticity.
11. Determine the aromaticity of heterocyclic compounds and nitrogen acidity.
12. Use IR, NMR, UV, and MS to determine the structures of aromatic compounds.
13. Predict products and give mechanisms for electrophillic aromatic substitutions.
14. Design syntheses that use the influences of substituents to generate the correct isomers of multisubstituted aromatic compounds.
15. Explain how Friedel-Crafts Acylation overcomes two of the three limitations of Friedel-Crafts Alkylation
16. Show how to synthesize ketones and aldehydes from oxidation of alcohols, ozonolysis, Friedel-Crafts acylations, organolithiums, and acid chlorides.
17. Show mechanisms of nucleophillic additions and condensation reactions.
18. Interpret the IR, NMR, UV, and MS of ketones and aldehydes.
19. Predict the products of McLafferty rearrangement in the Mass Spectrometer
20. Predict the approximate maxima for allowed and forbidden electronic transitions.
21. Show how to synthesize amines by reductive amination and acylation-reduction.
22. Predict the basicity of amines.
23. Use amines in synthesis.
24. Interpret the IR, NMR, UV, and MS of amines.
25. Name and identify acids, acid chlorides, anhydrides, amides, esters, carbonates, and urethanes.
26. Use carboxylic acids and derivatives in fisher esterification and hydrolysis reactions.
27. Show how to interconvert acid derivatives by Nucleophillic Acyl Substitution.
28. Interpret the IR, NMR, UV, and MS of carboxylic acids.
29. Identify and name essential features of carbohydrates and nucleic acids.
30. Determine the structures of the anomers and epimers of glucose.
31. Name monosaccharides and disaccharides, and draw their structures from their names.
32. Predict reaction products and write mechanisms involving carbohydrates.
33. Recognize the structures of DNA and RNA, and draw the structures of a ribonucleotide and deoxyribonucleotide.
34. Name amino acids and peptides, and draw the structures from their names
35. Explain which amino acids are acidic, basic, or neutral.
36. Show how an amino acid is synthesized.
37. Show how classical and solid-phase peptide synthesis would be used to make a given peptide.
38. Discuss and identify the four levels of protein structure.
39. Classify lipids.
40. Predict physical properties of fats and oils.
41. Identify isoprene units in terpenes.
42. Explain how soaps and detergents work.
43. Synthesize and analyze, ethers, aromatics, carbonyls, and amines in the laboratory.