

Syllabus, Chem 245

Organic Chemistry for Chemical Engineers Fall 2016

M: 10:45 AM to 12:55 PM, Kupferin Hall 211

T: 10:00 AM to 12:55 PM, Kupferin Hall 209

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Office Hours: Tiernan Hall 323A, Monday, Tuesday 1:30 pm-3:00 pm or by arrangement

Textbook: Organic Chemistry, 12th edition by T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder (Wiley Publishing)

Hard cover: ISBN 978-1-118-87576-6

Binder ready version: ISBN 978-1-119-07725-1

Electronic book: ISBN 978-1-119-23364-0

The Study Guide for the textbook may be useful and is recommended. Any inexpensive set of molecular models is highly recommended and models can be used during exams.

Material to be covered and tentative exam dates:

Chapter 1: Carbon Compounds and Chemical Bonds

Chapter 2: Representative Compounds, and Functional Groups, Intermolecular Forces and Infrared Spectroscopy

Chapter 3: Organic Reactions, Acids and Bases

Chapter 4: Alkanes, Nomenclature, Conformational Analysis and Synthesis

Chapter 5: Stereochemistry

Exam 1: 9/27/2016

Chapter 6: Ionic Reactions

Chapter 7: Alkenes and Alkynes 1, Properties and Synthesis

Chapter 8: Alkenes and Alkynes 2, Addition Reactions

Chapter 9: NMR Spectroscopy and Mass Spectrometry

Chapter 10: Radical Reactions

Exam 2: 10/24/2016

Chapter 11: Alcohols and Ethers

Chapter 12: Alcohols from Carbonyl Compounds

Chapter 13: Conjugated Unsaturated Systems

Chapter 14: Aromatic Compounds

Chapter 15: Reactions of Aromatic Compounds

Exam 3: 11/15/2016

Chapter 16: Aldehydes and Ketones 1, Addition Reactions

Chapter 17: Carboxylic Acids and Derivatives

Chapter 18: Enols and Enolates, Reaction at the alpha Carbon

Chapter 19: Condensations and Conjugate Addition

Chapter 20: Amines

Chapter 21: Phenols and Aryl Halides (Time permitting)

Quizzes:

Short quizzes will be given each week when there is no exam. Quiz grade averages will be added to exam grade totals to calculate the final grade. The quizzes are therefore of significant value.

Exams:

Exams will be closed book and two hours long. Calculators will be allowed. Smart phones are not allowed during exams and may not be used as calculators.

Final Exam:

The final exam will cover mainly the material presented after exam 3, but the nature of the course is cumulative, so earlier concepts will be very important.

Grading:

The lowest grade of the first 3 exams will be dropped in calculating the final grade. Two exams and the final exam will each count 25% towards the final grade. The quizzes will also count 25%. Recommended problems will be listed on Moodle for each chapter and answers will be posted at a later date. Attendance is required at lectures and will be considered in determining the final grade. Exams and quizzes must have final answers written in ink or regrading will not be considered.

The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.

Learning Outcomes:

Upon completion of the course you should have a facility in the following areas:

1. Interpret 2-dimensional representations of molecular structures in 3-dimensions
2. Understand the geometry resulting from atomic orbital hybridization
3. Know how electronegativity and resonance causes charge distribution on molecules
4. Relate geometry and charge distribution to chemical and physical properties
5. Understand how kinetics, thermodynamics and statistical mechanics describe chemical reactions
6. Draw the structures of the products given specific reactants
7. Write the mechanisms of the reactions covered
8. Understand how physical conditions influence rate and path of reactions
9. Use IR, NMR and UV spectroscopy and mass spectrometry to determine molecular structure