

# CHEM 245 Syllabus

Organic Chemistry for Chemical Engineers -- Fall 2018

M: 10:00 AM to 1:00 PM, Kupfrian Hall 203

F: 1:00 PM to 3:10 PM, Kupfrian Hall 203

Instructor: Samuel D'Arcangelis, Ph.D.

Phone: 201 486 7368

Office: Tiernan 323A

email: [sdarc@njit.edu](mailto:sdarc@njit.edu)

Office Hours: Kupfrian Hall 203, Fridays from ~11:00 AM to 1:00 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

Material to be covered and tentative exam dates:

Chapter 1: Carbon Compounds and Chemical Bonds

Chapter 2: Representative Compounds, 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

Chapter 6: Ionic Reactions

Chapter 7: Alkenes and Alkynes 1, Properties and Synthesis

**2/16/2018:** Exam 1 Chapters 1 – 6 (Chapter 7 carries over to the next exam)

Chapter 8: Alkenes and Alkynes 2, Addition Reactions

Chapter 9: NMR Spectroscopy

Chapter 10: Radical Reactions

Chapter 11: Alcohols and Ethers

Chapter 12: Alcohols from Carbonyl Compounds

Chapter 13: Conjugated Unsaturated Systems

**3/12-3/16:** Spring Break

**3/19/2018:** Exam 2: Chapters 7 – 12 (Chapter 13 carries over to the next exam)

Chapter 14: Aromatic Compounds

Chapter 15: Reactions of Aromatic Compounds

Chapter 16: Aldehydes and Ketones, Addition Reactions

Chapter 17: Carboxylic Acids and Derivatives

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

Chapter 19: Condensations and Conjugate Addition

**4/20/2018:** Exam 3: Chapters 13 – 18 (Chapter 19 carries over to the final exam)

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

Chapter 19: Condensations and Conjugate Addition

Chapter 20: Amines (Time permitting)

Chapter 21: Phenols and Aryl Halides (Time permitting)

**5/7/2018:** Final Exam: Primarily Chapters 7, 8 and 10 to the limit of coursework (Chs. 19~21, with all other chapters represented to some small extent.

(CONTINUED ON BACK OF THIS PAGE)

### Quizzes:

Short quizzes will be given at the end of each Friday lecture 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:

The three 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. The exact dates of these examinations are yet to be determined because of

### Final Exam:

The Final Examination will be comprised about half the material presented after Exam #3, and half the material before. The nature of the course is cumulative, so earlier concepts will be very important.

### Grading:

The lowest grade of the three Exams will be dropped in calculating the final grade. The two best of three Exams and the final exam will each count 20% towards the final grade for a total of 60%. The quizzes will also count 30% in total. Attendance is required at lectures and will contribute 10% in determining the final grade.

The NJIT Honor Code shall 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. Interpreting 2-dimensional representations of molecular structures in three dimensions
2. Understanding the geometry resulting from atomic orbital hybridization
3. Knowing how electronegativity and resonance causes charge distribution on molecules
4. Relating geometry and charge distribution to chemical and physical properties
5. Understanding how kinetics, thermodynamics and statistical mechanics describe chemical reactions.
6. Drawing the structures of the products given specific reactants.
7. Writing the mechanisms of the reactions covered.
8. Understanding how physical conditions influence rate and path of reactions.
9. Using IR, NMR and UV spectroscopy to determine molecular structure.
- 10 Building a solid, practical basis for the student to comprehend and conduct multi-step organic syntheses, complete with an understanding of optimal conditions and defending a rationale for proposed synthetic paths.