

Organic Chemistry 2 - Structure & Reactivity 2007

Lecture/Discussion: M, W, F - 9am LBR-252 Dr. Paul Scudder

Recitation Tues. 9am LBR-252 or 7pm HNS-108; Exams & workshops Thurs. 9 am LBR-252

Required Texts: "Organic Chemistry," Second Edition, Joseph Hornback, ©2006
Paul H. Scudder, Electron Flow in Organic Chemistry, Wiley ©1992

Recommended Text: "Student Solutions Manual & Study Guide for Hornback's Organic Chemistry" J. Hornback & B. Murugaverl ©2006

My office is HNS 221A (mailbox in HNS 111, phone 359-4392, email: scudder@ncf.edu, web site: <http://www.ncf.edu/~scudder/>) and office hours are the half hour before class; I am generally available, so just drop by if you have questions. Any student who anticipates missing an exam is expected to notify me ahead of time and arrange to take it early. The material covered up through Tuesday is on the Thursday evaluation.

Regular sustained effort and working on your weak areas are the keys to success. Do not allow yourself to get behind. Read the assigned material before class so you don't have to write down things that are already in your text. You are expected to have done the reading and be ready to discuss the assigned homework for the day. Homework for the week is due in the TA boxes by 5pm Friday and will be returned in the Tuesday recitation section. Although class attendance is not mandatory, I will take roll and comment on attendance on the evaluation because poor attendance usually correlates with poor performance on exams. All exams are cumulative, so patch holes.

- 1M Welcome. Organizational stuff. Hand out practice exam. Review proton transfer. Polyprotic acids. Exercises: Proton transfer review sheet (handout)
- 1T TA Recitation sections/workshops. Review material and go over practice exam questions
- 1W Review Substitution and Elimination, energy surfaces, substitution vs elimination decision. Exercises: Substitution and elimination review sheets (handouts)
- 1R Theory & Mechanism Workshop in LBR-252 Read PHS Ch 6.1-6.2 and 9.1-9.4 Bring Questions!
- 1F Review Electrophilic Additions to alkenes, alkynes, dienes, and aromatic rings. Review trends. Exercises: Addition review sheet (handout)

Feb. 9, Friday, 6pm - 10pm, Chae, Eval 1 (for everyone including semester 1 incompletes)

- 2M 17.10 Nucleophilic Aromatic Substitution: Diazonium Ions 17.11 Nucleophilic Aromatic Substitution: Addition-Elimination 17.12 Nucleophilic Aromatic Substitution: Elimination-Addition 17.13 Some Additional Useful Reactions 17.14 Synthesis of Aromatic Compounds. Exercises: 17.24, 17.27aceg, 17.23efg, 17.34, 17.58f, 17.60.
- 2T TA Recitation sections/workshops. Review material and go over exam 1 questions
- 2W Start Ch18. Additions to the Carbonyl Group: Reactions of Aldehydes and Ketones 18.1 General Mechanisms 18.2 Addition of Hydride: Reduction of Aldehydes and Ketones 18.3 Addition of Water 18.4 Addition of Hydrogen Cyanide. Exercises: 18.2ab, 18.3, 18.6a, 18.5, 18.34
- 2R Theory & Mechanism Workshop in LBR-252

- 2F 18.5 Preparation and Properties of Organometallic Nucleophiles 18.6 Addition of Organometallic Nucleophiles 18.7 Addition of Phosphorus Ylides; The Wittig Reaction. Exercises: 18.8b, 18.9dg, 18.10ag, 18.13e, 18.15c
- 3M 18.8 Addition of Nitrogen Nucleophiles 18.9 Addition of Alcohols. Exercises: 18.16b, 18.17, 18.20a, 18.22, 18.33a
- 3T TA Recitation sections/workshops. Review material and go over practice exam questions
- 3W 18.10 Conjugate Additions 18.11 Synthesis. Exercises: 18.25ab, 18.26ab, 18.29, 18.45, 18.56, 18.57
- 3R **Eval 2 in LBR-252 @ 9 - 10:20 am**
- 3F Start Ch. 19 Substitutions at the Carbonyl Group: Reactions of Carboxylic Acids and Derivatives 19.1 The General Mechanism 19.2 Preparation of Acyl Chlorides 19.3 Preparation of Anhydrides. Exercises: 19.2, 19.3, 19.5, 19.6, 19.40, 19.43
- 4M 19.4 Preparation of Esters 19.5 Preparation of Carboxylic Acids 19.6 Preparation of Amides. Exercises: 19.9d, 19.10, 19.12c, 19.15, 19.17ab, 19.19a
- 4T TA Recitation sections/workshops. Review material and go over exam 2 questions
- 4W 19.7 Reaction with Hydride Nucleophiles 19.8 Reduction of Acid Derivatives to Aldehydes 19.9 Reactions with Organometallic Nucleophiles. Exercises: , 19.21b, 19.23b, 19.34, 19.35, 19.45
- 4R Theory & Mechanism Workshop in LBR-252
- 4F 19.9 Reactions with Organometallic Nucleophiles 19.10 Preparation of Ketones 19.11 Derivatives of Sulfur and Phosphorus Acids. Exercises: 19.25a, 19.48, 19.50, 19.52, 19.57, 19.58
- 5M Start Ch. 20 Enolate and Other Carbon Nucleophiles 20.1 Enols and Enolate Anions 20.2 Halogenation of the α -Carbon 20.3 Alkylation of Enolate Anions 20.4 Alkylation of More Stabilized Anions. Exercises: 20.1, 20.5abc, 20.6abcde
- 5T TA Recitation sections/workshops. Review material and go over practice exam questions
- 5W 20.5 The Aldol Condensation. Exercises: 20.12, 20.13bc, 20.14, 20.15, 20.39abc
- 5R **Eval 3 in LBR-252 @ 9 - 10:20 am**
- 5F 20.6 Ester Condensations 20.7 Carbon and Hydrogen Leaving Groups 20.8 Enamines. Exercises: 20.18abc, 20.17, 20.16d, 20.41ab
- 6M 20.9 Other Carbon Nucleophiles 20.10 Conjugate Additions 20.11 Synthesis. Exercises: 20.25, 20.28, 20.29ac, 20.30f, 20.42ge
- 6T TA Recitation sections/workshops. Review material and go over exam 3 questions
- 6W Finish Ch. 20 and Start Ch. 21 The Chemistry of Radicals 21.1 Radicals 21.2 Stability of Radicals 21.3 Geometry of Carbon Radicals 21.4 Generation of Radicals Read PHS Ch 10.1 to 10.5 One Electron Processes, and do PHS prob.10.1,. Exercises: 20.43c, 20.47, 20.48b, 20.61, 21.4, 21.6,
- 6R Theory & Mechanism Workshop in LBR-252
- 6F 21.5 General Radical Reactions 21.6 Halogenation 21.7 Dehalogenation, Read PHS Ch 10.6 to 10.9 and do PHS prob. 10.5, 10.9, 10.10 Exercises: 21.8cd, 21.38

- 7M Finish Radical Reactions 21.8 Autoxidation 21.9 Radical Additions to Alkenes 21.10 Reductions and Radical Anions. Exercises: 21.14ade, 21.15b, 21.16cde, 21.35, 21.39
- 7T TA Recitation sections/workshops. Review material and go over practice exam questions
- 7W Start Ch. 22 Pericyclic Reactions 22.1 Pericyclic Reactions 22.2 MO Theory for Conjugated Molecules 22.3 Electrocyclic Reactions 22.4 Examples of Electrocyclic Reactions 22.5 Cycloaddition Reactions 22.6 The Diels-Alder Reaction. Exercises: 22.1, 22.2bc, 22.3e, 22.6, 22.9ab
- 7R **Eval 4 in LBR-252 @ 9 - 10:20 am**
- 7F 22.6 The Diels-Alder Reaction 22.7 Other Cycloaddition Reactions 22.8 Sigmatropic Rearrangements 22.9 Examples of Sigmatropic Rearrangements 22.10 Rearrangements to Electron-Deficient Centers. Exercises: 22.13, 22.14gh, 22.16bc, 22.18, 22.21e
- 8 Semester Break and study period. Catch up if you are behind. Bring your book!
- 9M Methods of Testing Mechanisms Read PHS 9.7 Do PHS prob. 9.5ab Exercises: 22.28g, 22.35, 22.41, 22.42
- 9T TA Recitation sections/workshops. Review material and go over exam 4 questions.
- 9W Methods of Testing Mechanisms Read PHS 9.7 Do PHS prob. 9.5ce Exercises: 22.44, 22.49, 22.51, 22.54
- 9R Theory & Mechanism Workshop in LBR-252
- 9F Start Ch. 23 The Synthesis of Organic Compounds 23.1 Protecting Groups for Alcohols 23.2 Protecting Groups for Aldehydes and Ketones 23.3 Protecting Groups for Carboxylic Acids 23.4 Protecting Groups for Amines. Exercises: 23.1cdf, 23.7ad, 23.8, 23.13abc, 23.17abc
- 10M 23.5 Retrosynthetic Analysis 23.6 Examples of Syntheses. Exercises: 15abc, 23.16ac, 23.18cd, 23.19cd
- 10T TA Recitation sections/workshops. Review material and go over practice exam questions
- 10W 23.7 Reactions That Form Carbon-Carbon Bonds 23.8 Preparation of Functional Groups. Exercises: 11abcd, 23.13h, 23.14c, 23.21, 23.22
- 10R **Eval 5 in LBR-252 @ 9 - 10:20 am**
- 10F Ch. 24 Synthetic Polymers 24.1 Radical Chain Polymerization 24.2 Structures of Polymers 24.3 Ionic Polymerization 24.4 Coordination Polymerization 24.5 Physical Properties of Polymers 24.6 Major Thermoplastic Addition Polymers 24.7 Elastomers 24.8 Condensation Polymers 24.9 Thermoset Polymers 24.10 Chemical Properties of Polymers. Exercises: 24.18ace, 24.19d, 24.20, 24.21, 24.22, 24.30
- 11M Start Ch. 25 Carbohydrates 25.1 Structures of Carbohydrates 25.2 Stereochemistry of Carbohydrates 25.3 Cyclization of Monosaccharides 25.4 Reactions of Monosaccharides 25.5 Fischer's Structure Proof for Glucose. Exercises: 25.3, 25.5, 25.17, 25.18, 25.21cd
- 11T TA Recitation sections/workshops. Review material and go over exam 5 questions
- 11W 25.6 Disaccharides 25.7 Polysaccharides 25.8 Other Carbohydrate-Containing Compounds. Exercises: 25.23, 25.24, 25.25, 25.27ab, 25.30
- 11R Theory & Mechanism Workshop in LBR-252

- 11F Start Ch. 26 Amino Acids, Peptides, and Proteins 26.1 Amino Acids 26.2 Acid-Base Chemistry of Amino Acids 26.3 Chemical Reactions of Amino Acids 26.4 Laboratory Synthesis of Amino Acids. Exercises: 26.5, 26.6bc, 26.7a, 26.8c, 26.10c
- 12M 26.5 Peptides and Proteins 26.6 Sequencing Peptides 26.7 Laboratory Synthesis of Peptides 26.8 Protein Structure. Exercises: 26.17cd, 26.19ab, 26.20ab
- 12T TA Recitation sections/workshops. Review material and go over practice exam questions
- 12W 26.9 Enzymes and Principles of Catalysis Handout. Exercises: 26.25ab, 26.27, 26.34abcd
- 12R **Eval 6 in LBR-252 @ 9 - 10:20 am**
- 12F Principles of Catalysis Handout. Exercises: 26.24, 26.28, 26.35, 26.37, 26.38
- 13M Enzyme mechanisms - Glycolysis. Exercises: 25.29, 25.35, 25.44, 25.45, 25.46, 25.47
- 13T TA Recitation sections/workshops. Review material and go over exam 6 questions
- 13W Example enzyme mechanisms - Glycolysis. Exercises: 25.33, 25.37, 25.43, 25.48, 25.49, 25.52
- 13R Theory & Mechanism Workshop in LBR-252
- 13F Start Ch. 27 Nucleotides and Nucleic Acids 27.1 Nucleosides and Nucleotides 27.2 Structure of DNA and RNA 27.3 Replication, Transcription, and Translation. Exercises: 27.1ab, 27.2bc, 27.7, 27.13
- 14M 27.3 Replication, Transcription, and Translation 27.4 Sequencing DNA 27.5 Laboratory Synthesis of DNA. Exercises: 27.11, 27.17, 27.21, 27.22, 27.24, 27.25
- 14T TA Recitation sections/workshops. Review material and go over practice exam questions
- 14W Start Ch. 28 Other Natural Products 28.1 Terpenes 28.2 Monoterpenes 28.3 Sesquiterpenes 28.4 Larger Terpenes 28.5 Steroids 28.6 Synthesis of Steroids. Exercises: 28.22, 28.28, 28.37, 28.41, 28.43
- 14R **Eval 7 in LBR-252 @ 9 - 10:20 am**
- 14F 28.6 Synthesis of Steroids. 28.7 Alkaloids
- 15M 28.8 Fats and Related Compounds 28.9 Prostaglandins
- 15T TA Recitation sections/workshops. Review material and go over exam 7 questions
- 15W Catch-up day and Review generally for ACS exam
- 15R Workshop in LBR-252 - Go over practice final exam
- 15F **Food additives special lecture May 18, Friday, 7 - 9 PM, ACS EXAM**

FINAL EXAM - MONDAY, May 21, 1 P.M. (graduating seniors must take the exam early)

The course is evaluated on the basis of seven cumulative exams together counting for 70%, the homework counts for 5%, the ACS standardized organic chemistry exam counting 10%, and final exam counting 15%. If your final is higher than any of your other exam scores, then the low exam will be dropped, and the final exam will count for 25%. An overall average of two-thirds correct is considered minimally satisfactory work.