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CHEM 307 B1/B2 COURSE SCHEDULE Summer 2020

Date	Reading & Learning Objectives to target per lecture*	End o/Chapter Problems
5/26	***Reading: Book sections: 1.1-2, 2.1-2.2*** • Syllabus; introduction to organic chemistry, • Atomic structure and the periodic table; valence electrons • Lewis structures; bonds as shared electron pairs, non-bonding electrons; common • Bonding patterns for C, N, O, X; formal charge; condensed structures; line-angle structures; use of R to denote substituents • Pauling electronegativity and polar bonds; **Recitations first day to practice Canvas Conferences-**	**Chapter 1:** 18-20 **Chapter 2:** 18, 23
5/27	***Reading Book sections 2.2-2.4, 10.2a-c*** • Introduction to resonance structures • Atomic orbitals (s, p); molecular orbital theory; bonding and anti-bonding orbitals, sigma (σ) and pi (π) orbitals; bond strengths • VSEPR, bond angles, molecular shape and molecular dipoles; wedge-dash notations • Using molecular models • Orbital hybridization and molecular shape; double and triple bonds • Delocalized electrons, resonance structures and orbital hybridization **Practice Lecture Quiz**	**Chapter 2:** 2, 16, 17, 20, 21, 22, 24, 26, 27
5/28	***Reading Book sections: 2.5-2.7, 1.1b, 1.3-4*** • Writing resonance structures practice • Introduction to IUPAC nomenclature and functional groups: with focus on alkanes, cycloalkanes, alkyl halides and alcohols; constitutional isomers	**Chapter 1:**21a, 26, 28, 29 abce, 31, 38a **Chapter: 2:** 28, 29, 30, 31, 32
5/30	**WEEK 1 QUIZ DUE (Chapters 1-2)**	
6/1	• ***Reading Book sections: 2.8, 3.1-3.2*** • Intermolecular forces: van der Waals interactions, electrostatic forces, hydrogen bonds • Physical properties and intermolecular forces and its effect on life • Conformations of acyclic hydrocarbons; Newman projections; gauche, anti, eclipsed conformations; hyperconjugation as a stabilizing effect; • intro to potential energy diagrams; emphasis on line-angle condensed structures; use of wedges and dashes **WEEK 1 HW DUE 6/1/20**	**Chapter 3:** 13. 15,. 16, 17, and. 22 Practice drawing cyclohexane chair conformers (p. 84)

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Date	Reading & Learning Objectives to target per lecture*	End o/Chapter Problems
6/2	***Reading Assignment Book sections: 3.2-3.4 and 4.1-4.2*** • Conformations of cyclic hydrocarbons • Conformations of cyclohexane and substituted cyclohexanes; drawing chair conformers; • Equilibria between chair conformers; free energy differences and equilibrium constants • Configurational isomers: cis and trans-substituted cycloalkanes	**Chapter 3:** 18a,c,d,; 19, 20, 22, 24, 25, and 27 **Chapter 4:** 14-21, 22, 25, 26, 28-30
6/3	***Reading Assignment Book sections: 4.2-4.4*** • Stereoisomers; geometric isomers; cis- and trans-alkenes, alkene nomenclature and E/Z nomenclature. • Chiral centers, enantiomers and R/S nomenclature; wedge-dash and Fischer representations •	**Chapter 4:** 31, 34, 35, 36
6/4	***Reading Assignment Book sections: 4.4, 5.2-5.4*** • Optical rotation; absolute configurations: L-amino acids and D-sugars • Molecules with two or more chiral centers; diastereomers and meso compounds • Exam 1 review	
6/7	**WEEK 2 QUIZ DUE (open date 6/6/20)**	
Monday, 6/8 EXAM I		
6/9	***Reading Assignment Book sections: 5.2-5.4*** • Acid-base reactions; use of the arrow notation to indicate electron movement • pKa values: utility to indicate acid and base strengths and Keq Factors affecting acid/base strength: ion size, electronegativity, resonance, inductive effects, orbital hybridization (the arguments of organic chemistry) • Lewis acids and Lewis bases • Reaction Coordinate Diagrams	**Chapter 5:** 21-24 26-29, 31, 33 **Chapter 6:** 14 a-d, 15, 16-20, 21, 22 a b, 23-25
6/10	***Reading Assignment Book sections:6.1 -6.2*** • Nucleophilic substitution reactions: a mechanistic overview; energy diagrams • The SN2 reaction: mechanism (a HOMO-LUMO view), inversion of configuration; leaving groups, nucleophile strength, steric factors, solvent effects • The SN1 reaction: mechanism, carbocation intermediates	

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Date	Reading & Learning Objectives to target per lecture*	End o/Chapter Problems
6/11	***Reading Assignment Book sections::6.2-6.4, and 7.1a-c; 2d*** • SN2 (a HOMO-LUMO view), inversion of configuration; leaving groups, nucleophile strength, steric factors, solvent effects • The SN1 reaction: mechanism, carbocation intermediates and carbocation stability (hyperconjugation), racemic products; solvent effects; carbocation rearrangements • SN2 vs. SN1: competing reactions under kinetic control • Substitution reactions of alcohols and ethers in acid: generation of a good leaving group by protonation	**Chapter 6:** 14 a-d, 15, 16-20, 21, 22 a b, 23-25
6/15	***Reading Assignment Book sections: 7.2a-c, e*** • Substitution reactions of alcohols using alkylsulfonyl chlorides (RSO_2Cl); conversion to alkyl halides using phosphorous tribromide or thionyl chloride • Synthesis of ethers and epoxides • Substitution reactions of epoxides in acid and base	**Chapter 7:** 17, 23, 25, 27d, 29a,b,d-g
6/13-14	**WEEK 3 QUIZ**	
6/16	***Reading Assignment Book sections: 8.1-8. 3*** • Elimination reactions: a mechanistic overview, energy diagrams, alkene stability • E2 reactions of alkyl halides and sulfonate esters; mechanism, stereoselectivity and regioselectivity; competition with SN2 reactions • E1 reactions of alcohols in acid	**Chapter 8:** 13, 15-17, 20-22, 23 a-d, f-j, 25, 26 a b d e f i j; 28 a c d e
6/17	***Reading Assignment Book sections: 9.1-9.2*** • E1 reactions of alkyl halides; competition with SN1 reactions Substitution versus elimination: alkyl halides, alcohols • Electrophilic addition to alkenes: addition of HX, H2O •	**Chapter 9:** 23 – 28, 29 a b d g, 30
6/18	**WEEK 3 HW DUE**	
6/18	***Reading Assignment Book sections: 9.4- 9.5*** • Electrophilic addition of Cl2, Br2 to alkenes: stereoselectivity, regioselectivity; • Halohydrin formation • Oxymercuration/demercuration: regioselectivity Hydroboration/oxidation: stereoselectivity, regioselectivity • Alkene polymerization	**Chapter 9:** 25e h, 29 ce, 32 b c, 33, 34
6/20	**Exam review**	
Monday, 6/22 EXAM II		

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Date	Reading & Learning Objectives to target per lecture*	Recommended Problems
6/23	***Reading Assignment Book sections: 10.1-10.3*** • Electrophilic addition to alkynes • Carbenes: synthesis of cyclopropane rings • Multi-step synthesis using substitution, elimination and addition reactions:strategies, retrosynthetic analysis Dienes and polyenes: structure, nomenclature and stabilities • Molecular orbital descriptions of conjugated dienes and polyenes; UV-VIS absorption by conjugated polyenes, colored organic compounds • Electrophilic addition to conjugated dienes: kinetic *vs* thermodynamic control	**Chapter 10:** 11-14, 16, 18-21, 23 a e
6/23	**Week 4 Quiz Due**	
6/24	***Reading Assignment Book sections: 10.4, 11.1-11.3*** • The Diels-Alder reaction: mechanism, MO description and HOMO-LUMO theory, • stereoselectivity and regioselectivity • Oxidation states in organic chemistry • Catalytic hydrogenation reactions: reduction of alkenes and alkynes • Oxidation reactions of alkenes • Synthesis	**Chapter 11:** 10, 11, 13-16, 19
6/25	***Reading Assignment Book sections: 11.4; 12.1 -*** • Oxidation reactions of alcohols • Nomenclature of carbonyl compounds • Multi-step synthesis and retrosynthetic analysis • Free radical halogenations: mechanism; bond energies and regioselectivities; • the Hammond postulate; selectivity of bromination *vs* chlorination	**Chapter 1:** 22a,b,d,f; 30b,c,d,g,h, 32, 34 **Chapter 11:** 12d-d, 17, 23, 27b
6/28	**WEK 5 QUIZ due**	
6/29	***Reading Assignment Book sections: 12.2a-c, 3a-b*** • Reductions of benzyl alcohols, ethers and esters via radical intermediates: stability of the benzyl radical • Alkyne reduction by sodium in liquid ammonia: mechanism, stereoselectivity • Free radical addition reactions: anti-Markovnikov HBr addition, alkene polymerization	**Chapter 12:** 17, 18, 19g,h; 21a, 22a, 23a, 24a, 27 d,i, j, 28
6/30	***Reading Assignment Book sections:. 12.4ac*** Oxidation *via* radical intermediates: fatty acid oxidation, vitamins C and E, anti oxidant food preservatives, anti-oxidants in colored fruits	**Chapter 12:** 19, 25, 27, 28, 30a, 33, 34
7/1	Final Exam Review	
Thursday, 7/2 FINAL EXAM **(comprehensive w/emphasis on materials not covered in exams 1 and 2)**		

***depending on class progress and time some parts may be skipped**

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