

Chem 610: Organic Reactions 1

Room 2121, 2:20 - 3:35 pm, section 600, TR, 2015.

Professor Kevin Burgess, Room 301C, 845-4345, burgess@tamu.edu

Assistant: Jill Powers, room 2161 ILSB, Powers@chem.tamu.edu Mon - Fri 1 – 5 pm

A. Textbooks

All the following books will be used for this course:

- Organic Chemistry, by Clayden, Greeves, and Warren, Oxford. *Second Edition*
- Strategic Applications of Named Reactions in Organic Synthesis, László Kürti and Barbara Czakó.
- Organic Chemistry By Inquisition, by Kevin Burgess (www.byinquisition.org; "Inquisition").

There will also be a set of supporting class notes that you will need to buy from an organization such as "Copy Corner" (to be announced); this will cost around \$25.

B. Assigned Groups

Each student will be assigned to a group in the first lecture, and stay with it until the end of semester. *No changing between groups is permitted.* Everyone is encouraged to meet in these groups to study the homework assignments. I am going to ask you to sit in assigned seats based on these groups.

C. Lecture And Homework Format

Topics for each lecture are shown in the "Tentative Schedule" table below, with the corresponding homeworks scheduled for each lecture. Typically, these homeworks are of the following types:

- complete a chapter of the supporting class notes *in your own handwriting*, tear it out of the book, put your name on it, and submit it in class;
- study the assigned chapter in Clayden, the By Inquisition Book, or specific reactions (usually from Kurti) and be prepared to be tested on them; and,
- topics covered in the previous class.

Usually there will be at least one assignments in each class, and *some* of these will be graded randomly over the semester to give a total of 20 points maximum. 12 assignments will be graded (2 pt each), and the best 10 will be recorded. These assignments typically will be some combination of:

- a timed individual quiz;
- a competitive task from the assigned groups;
- presentation on the board to rest of class, either by solving a problem or by ppt; and/or,
- submitting the supporting course notes mostly correct and complete, and in your own handwriting.

Groups will hand in one answer, and every group member will receive the same score.

There will also be an individual ppt presentation for everyone in class. This will be out of 5 pts: 2 pt for quality of *original* ChemDraw graphics drawn ACS style (copies from book are not to be used), 2 pts for ppt format, and 1 pt for delivery. Maximum of 5 slides and 4 mins. Quality counts far more than quantity.

D. Grading Structure

Throughout, 1 pt = 1 %. Queries about points and grades should be addressed to Jill Powers.

exam 1	exam 2	exam 3	cumulative final	in class assignments (typically 2 pts each)	TOTAL
15	15	15	30	25	100

E. Exam Schedule

	tentative date	subject material on lectures (and corresponding assignments)
exam 1	tentatively Oct 13	1 - 8
exam 2	tentatively Oct 27	9 - 14
exam 3	tentatively Nov 17	15 - 19
final	Dec 16 1 – 3 pm, firm	cumulative

F. Make-up Exams

Ideally, there will be no make-up exams. If a student has to miss an exam because of an excused absence as designated in the official *Texas A&M University Regulations* (see below) he/she should:

- (i) Before the exam, contact Ms Jill Powers, (Powers@mail.chem.tamu.edu, 845-2964 am, 845-1847 pm, or leave message) with a reason. Ms Powers will document such emails/calls. Students who can anticipate an excusable absence should provide notification before the day of the exam. Notifications should be received absolutely no later than two working days after the exam, and then only in cases of extreme hardship.
- (ii) Written explanations must then be submitted to Ms Powers at the earliest possible time, with supporting documentation. Written requests that are not received within two working days of the absence will usually be denied (see University Rules).

There are no make-ups on quizzes: if one of the graded ones is missed then that will count as one of the two dropped grades.

G. Opportunities For Meeting KB

Catch me after class, email me, or email Jill to arrange a meeting.

H. Legal Stuff

Copyright Notice. All handouts used in this course are copyrighted and may not be copied without my expressly granted permission. By “handouts”, are all materials generated for this class, including but not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, problem sets or other materials. Tutors and tutoring services are expressly forbidden from copying any of these materials. Only students currently enrolled in the class may make a single copy of this material for their personal use.

Excused Absences. Absences of less than three days due to injury or illness will require that you provide either a physician’s note affirming the date and time of visit related to the absence or the TAMU Explanatory Statement for Absence from Class form available at: <http://shs.tamu.edu/forms.htm>. You may use this form to document excused absences of less than three days. However, if you do not have a physician’s note, please keep in mind that the information will be verified. Any misinformation included on the form or an inability to verify the information will lead to sanctions under the Aggie Code of Honor. Absences of three or more days due to illness or injury will definitely require a physician’s note or other acceptable documentation. Appropriate documentation will be required for other excused absences. The University’s policy has an absolute deadline (by the end of the second working day after the absence) by which you must notify the professor of any excused absence. Delays in notification usually raise some doubts about the validity of the excuse. Do not take this admonition lightly since some people receive zeros on exams each semester for failure to follow this University regulation. It is your responsibility of a student requesting an excused absence to contact the Prof, not his/hers to contact them, so e-mailing asking me to contact you is unacceptable. You must keep trying to contact me or Jill to talk with me either in person or on the phone until you are successful.

Americans with Disabilities Act (ADA) Policy Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>

“An Aggie does not lie, cheat, or steal or tolerate those who do.” All TAMU students commit to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

I. Detailed Schedule

lecture (date)	topics that will be covered	study assignment for next class
1 (S1)	1. Nucleophilic Substitution At Saturated Carbon Finkelstein. Krapcho. Gabriel. Mitsunobu. Heine, Arbuzov, Baldwin's rules for sp^3 .	Notes 1 and 2. Notes for following lecture every time after this. Inquisition A - C.
2 (S3)	2. Aromatic Substitutions Bischler-Napieralski, Vilsmeier-Haack formylation Fukuyama Ns, Sniekus directed ortho-metalation	Notes 3. Smiles, Pictet-Spengler
3 (S8)	3. Elimination Reactions Burgess' reagent (Wipf), Hoffmann elimination sulfoxide and selenoxide eliminations (not in book), mechanism of boronate oxidation, Chang	Notes 4. PNAS, 2010, 107, 21316, Inquisition E
4 (S10)	4. Nu Addition To Aldehydes And Ketones Under Acid Conditions ninhydrin test, Mannich, Petasis Boronic Acid-Mannich Passerini, Ugi, and Bignelli MCRs	Notes 5. Ugi reactions, Clayden 19
5 (S15)	5. Oxidation Of Carbonyl Compounds Swern, Corey-Kim, Garnem, Dess-Martin, Pinnick chromium-based oxidations (PDC, PCC, Jones, Collins) Pinnick, Oppenauer	Notes 6. read into all aspects of today's lecture, Ley-Griffith oxidation
6 (S17)	6. Reduction Of Carbonyl Compounds Meerwein-Ponndorf-Verley, CBS Noyori transfer hydrogenation,	Notes 7a - d, Inquisition G and H, Staudinger reaction
7 (S22)	7. Hydrolysis and Acylation Reactions Involving Carboxylic Acid Esters review of acid coupling agents, Staudinger couplings	Notes 8. Inquisition D. Edman degradation
8 (S24)	8. Peptide Synthesis and Protecting Groups OBOC (split syntheses), Houghton method, Arora ligation, BrCN cleavage, Bode coupling	Notes 9a - b. cyanogen bromide cleavage, Hell-Volhard
9 (S29)	9. Enols and Enolates With Simple Electrophiles alkylations of Evans enolates, Enders hydrazone alkylation	Notes 10. Inquisition L, Clayden 41
10 (O1)	10. Enols and Enolates With Carbonyl Compounds Dieckmann, Claisen condensation, Knoevenagel, Mannich, Evans aldol, Robinson, Pechmann	Notes 11. Inquisition M, Clayden 31 & 32
11 (O6)	11. Conformational Analysis And Diastereoselectivity Felkin-Anh, double diastereoselection	Notes 12. Clayden 33, Ferrier rearrangement

12 (O8)	12. Stereochemistry Via Carbohydrates Petasis-Ferrier, Kahne glycosylation, Amadori reaction opening carbohydrates with Wittig agents	Notes 13. Learn all 8 DNA/RNA bases.
E1 (O13)	exam 1 on chapters 1 – 8	
13 (O15)	13. Nucleoside And Nucleotide Chemistry Vorbrüggen reaction DNA encoded combinatorial libraries	No notes after this point unless otherwise directed. Sharpless epoxidation, Payne Sharpless asymmetric dihydroxylation
14 (O20)	14. Epoxidation, Hydration And Oxidative Cleavage Davis oxaziridine oxidation, Shi Jacobsen hydration, Coates	Clayden 34, Staudinger ketene cycloaddition, De Mayo
15 (O22)	15. Cycloaddition Reactions Danishefky's diene, hetero Diels-Alder, click chemistry Qing Li	Clayden 35, Buchner ring expansion, Nazarov
16 (O25)	16. Sigmatropic And Electrocyclic Reactions Fukuyama OL, Davies, Hsung, West, Fleming, Fisher indole	Inquisition K, Brook
E2 (O27)	exam 2 on chapters 9 - 14	
17 (N3)	17. Rearrangement Reactions Baeyer-Villiger, Curtius, Schmidt Claisen rearrangement, oxy-Cope, Neber Smith on Brook rearrangement, Demjanov rearrangement	Inquisition J, Clayden 36, Echenmoser-Tanabe
18 (N5)	18. Fragmentation Reactions Grob, Deslongchamps	Clayden 37, Birch reduction, Minisci,
19 (N10)	19. Radical Reactions and C-H Activation 1 Barton and Barton McCombie radical decarboxylation, Baran chemistry 1	acyloin, Barton nitrite ester reaction, get ChemDraw and Office
20 (N12)	20. Radical Reactions and C-H Activation 1 Baran chemistry 2	special homework, student presentations
N17	exam 3 on chapters 15 – 19	
21 (N 19)	21. Organo- and Photoredoxcatalysis Robinson, Hajos-Parrish	Clayden 40, Suzuki, Heck, Tjuji-Trost allylation
22 (N24)	22. Metathesis And Coupling Reactions Metathesis, Buchwald-Hartwig, , Miyuara boration	Clayden 38, Davies Chemistry from <i>Chem. Soc. Rev.</i> , 2009, 38 , 3061, Corey-Fuchs
23 (D1)	23. Nitrenes and Carbenes Corey-Winter, Seyferth-Gilbert, photoaffinity labeling	Inquisition N – P, Clayden 29 and 30
24 (D3)	24. Heterocyclic Chemistry to be decided Bode SnAP chemistry	

Permission To Post Grades Form

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name in BLOCK CAPITALS: _____

email address IN BLOCK CAPITALS: _____

Please define a personal, secret "nickname" that will be used to post grades (physically or via email). Students who do not give permission cannot access their grades until they are officially released at the end of the semester.

By defining a suitable personal secret password you are giving permission to post grades. The personal secret password must *START WITH A LETTER* (not a number, because the grades will be posted alphabetically) and consist of 5 – 10 characters.

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Are you the person in the class who is going to forget your password? It will cost you time if you do. If you are the one, email: Powers@mail.chem.tamu.edu and try to find out from her what it is, or go to her and fill in another form.

FOLD THIS FORM SO THAT NO ONE READS YOUR NICKNAME, AND PASS THE FOLDED FORM TO THE END OF THE ROW AT YOUR RIGHT FOR COLLECTION