Chem 531/730 Organic Chemistry

spring 2019
Schedule number: 25037/35040

Professor Jeffrey Gustafson
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COURSE INFORMATION

Class Days: MW
Class Times: 5:00-6:15 PM
Class Location: GMCS 306

Office Hours: MF 4:00PM-5:00 PM
Office Hours Location: CSL 208

Course Overview

Chem 732 is a graduate level organic reactions and mechanisms class. My goal is to use modern drug discovery as a platform to further your knowledge of chemistry. As such there will be no textbook rather a great organic reaction encyclopedia (SANROS) and a few recent papers (10.1021/acs.jmedchem.8b00260 (on blackboard)). The Paper discusses the syntheses of 19 FDA approved small molecule drugs from 2016. Thus my lecture will consist of the instructor going through each drug's synthesis, while stopping to expand upon each new mechanism. 4 times throughout the semester we will have problem solving session where the class will be broken up into teams 10 teams of roughy four. Each team will be given a FDA approved drug and ~45 minutes to come up with a draft synthetic plan. After approval of the plan the students will have the access to Scifinder to refine their plan (come up with synthesis of fragments, etc). The next class period 4- 5 teams will present their proposed synthesis and compare it to the actual synthesis of the drug found in scifinder. The teams will be picked at random and conserved for the semester. Each team must present twice. Chem 730 students will be expected to hand in a written assignment discussing their synthesis and pratfalls they found with their original plan. There will be one written exam on a October 11th, and a written final on Friday December 15th

Student Learning Outcomes

1) **Outcome**: Students will be able to identify, classify and explain the most used reactions in drug discover and display an cursory understanding of their reaction mechanism.
Activity: Each lecture will cover the synthesis of an FDA approved drug followed a details mechanism of each new reaction, drawing analogies to previous reactions (i.e comparing Suzuki coupling to a Stille coupling).
Assessment: This will be assessed by performance on mid-term exam, one final exam, and performance in the group activities (which I will be observing).

2) **Outcome** Students should be able to propose a reasonable synthesis of a moderately complex 'drug-like' molecule
Activity: The described group activities (see below)
Assessment: This will be assessed by performance on mid-term exam, one final exam, and the reports and presentations that each team turns in after the group activity.

3) **Outcome** Students should be able to apply SciFinder to aid in the planning of syntheses of molecules with moderate complexity.
Activity: The described group activities (see below)
Assessment: This will be assessed by performance on mid-term exam, one final exam, and the reports and presentations that each team turns in after the group activity.

4) **Outcome** Students should be able to effectively as a team to solve problems in synthetic chemistry, and effectively communicate proposed solutions to their peers

Activity: The group activities will be self driven. However the lecturer will be around to help direct discussion as needed. The team presentations will be led by graduate students. 30% of the class periods (1 day team work, 1 day presentations) will be group activities. 70% of periods will be lectures.
Assessment: The lecturer will observe how each student participates in group activities as well as the quality of their contribution. In addition, each of the team members fill out a short survey describing how each of the team member contribute.

5) **Outcome** Students should be able to apply concepts from chem 232/432 to solve mechanisms of reactions with relevance to pharmaceuticals
Activity: Each lecture covered the synthesis of a different FDA approved drug. Students are expected to find the similarity to those reactions covered in their undergraduate organic classes and make the analogies between mechanisms.
Assessment: This will be assessed by performance on mid-term exam, one final exam, and performance in the group activities.

Enrollment Information

Prerequisites: A grade of 'C' or better in Chem 432 or corresponding course or graduate standing.

Course Materials

- ***Book:*** Author Kurti and Czako
- Title: Strategic applications of named reactions in organic synthesis (SANROS)
- Publisher: Elsivier
- Year 2017 (newest edition)

Course Structure and Conduct

My goal is to use modern drug discovery as a platform to further your knowledge of chemistry. As such there will be no textbook rather a great enclopedia (SANROS) and a few papers (10.1021/acs.jmedchem.8b00260). The Paper discusses the syntheses of 19 FDA approved drugs from 2016. Thus my lecture will consist of the instructor going through each drug's synthesis, while stopping to expand upon each new mechanism. 70% of the class periods will be lectures. 30% of the periods will be designated for group activities where the class will be broken up in teams. Each team will be given a molecule and 1 hour to come up with a synthesis (with access to SANROS and SCiFINDER on a student lap top). Each team will then present their synthesis during the next class period. Graduate students are required to be 'team leaders' at least once. Responsibilities of a team leader include tying each of the members contributions together to yield a coherent report of the teams conclusions. The team leader will also be expected to be the main presenter for the team the following class period. Each time we do this teams have to be different.

Course Assessment and Grading

There will be one mid term and a final exam. The midterm is worth 250 points (25% of the final grade), The final is worth 250 points (25%), and 4-group activities (where students are broken up into teams to design synthesis of drug-like molecules), will be worth 350 points (35% of the grade). 150 points (15% of the graduate student grade) will be based on a final paper on a proposed synthesis of a FDA approved drug. The effectiveness of communicating the synthetic strategy will be assessed for boththe presentations and the final paper. The final 15% of undergraduates grades will be based on class participation and engagement in the group activities, based both on peer review and the lecturer's observations.

- **Letter Grade Assignment:** Undergraduates grades will be assigned based on class performance, with the undergraduate average assigned as a ' low B'. Graduate students will be graded on a different scale as they have more experience with organic reactions and typically perform better. The graduate average will also be

assigned as a low B and assigned accordingly.

Students with Disabilities

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Academic Honesty

The University adheres to a strict policy regarding cheating and plagiarism. These activities will not be tolerated in this class. Become familiar with the policy (http://www.sa.sdsu.edu/srr/conduct1.html). Any cheating or plagiarism will result in failing this class and a disciplinary review by Student Affairs.

Examples of Plagiarism include but are not limited to:

- Using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work)
- Copying and pasting work from an online or offline source directly and calling it your own
- Using information you find from an online or offline source without giving the author credit
- Replacing words or phrases from another source and inserting your own words or phrases
- Submitting a piece of work you did for one class to another class

If you have questions on what is plagiarism, please consult the policy (http://www.sa.sdsu.edu/srr/conduct1.html) and this helpful guide from the Library:(http://infodome.sdsu.edu/infolit/exploratorium/Standard_5/plagiarism.pdf)