Course Syllabus – CHEM 610

Course Information

Course Number: CHEM 610 WI21
Course Name: Classics in Total Synthesis
Term: WI 2021
Start Date: 01/05/2021
End Date: 03/26/2021
Credits: 3.0

Meeting Days / Times

Tuesdays and Thursdays, 11:15am-12:45pm PT / 2:15-3:45pm ET
(See Calendar in Canvas for the most up-to-date schedule.)

Location

Online via Zoom

Course Managers

Role	Last Name	First Name	Email Address
Instructor	Shenvi	Ryan	rshenvi@scripps.edu
Instructor	Renata	Hans	hrenata@scripps.edu
TA	Bi	Cheng	chengbi@scripps.edu

Course Description

This course covers the reactions, strategies, and tactics needed to tackle the molecular complexity posed by the structures of complex natural products. Building upon reactions learned in previous course, additional examples of modern methods for bond-forming reactions will be presented, as will the tools necessary to logically analyze and build complex molecular targets. The interplay between reaction and strategy development, using natural products as sources of inspiration for the development of novel chemistry, will also serve as a major organizing theme for the course.

Program Learning Outcomes

By the end of the program, students will have accomplished these objectives:
PLO1: Original Research – graduate students are expected to develop the skills critical for generating high-quality research output. This would include absorbing, recalling, and

contextualizing scientific knowledge, evaluating scientific information and data, creating testable hypotheses and investigating hypotheses, mastering scientific tools and techniques, displaying ethical behavior, and receiving and giving feedback.
PLO2: Communication – graduate students are expected to demonstrate the oral, written, and media skills to effectively communicate the impact of a study or a body of work to the greater scientific community and to the public at large using a number of methods.
PLO3: Critical Thinking – graduate students are expected to develop a self-directed process to analyze information, form opinions or judgments, and use this process to improve the quality of their scientific thoughts, navigate problems, and make informed decisions.
PLO4: Intellectual Curiosity – graduate students are expected to acquire the capacity to build their intellectual curiosity and demonstrate problem solving approaches that serve their professional growth and ability to impact a field.
PLO5: Career and Professional Development – graduate students are expected to develop a variety of transferable skillsets throughout their graduate experience, including management and leadership, inclusiveness, resilience, scientific rigor, collaboration, accountability, time management, teamwork, networking, and career planning.

Course Learning Outcomes

Upon completion of this course students will be able to:
CLO1: Read and understand complex molecule synthesis papers in the literature.
CLO2: Design multistep syntheses through the principles of retrosynthetic analysis.
CLO3: Possess enhanced understanding of organic reactions and reactivity.
CLO4: Write and evaluate proposals in total synthesis.
CLO5: Have strengthened analytical skills.

Background Preparation (Prerequisites)

CHEM 410 Modern Organic Synthesis

Course Materials

Required: Kurti, L. & Czako, B. (2005). Strategic Applications of Named Reactions in Organic Synthesis. ISBN: 978-0124297852.
Required: Corey, E. & Cheng, X. (2009). The Logic of Chemical Synthesis. ISBN: 978-0471115946.
Useful to Consult: Nicolaou, K. & Montagnon, T. (2008). Molecules that Changed the World. ISBN: 978-3527309832.
Useful to Consult: Kocienski, P. (2005). Protecting Groups (3rd Edition). ISBN: 978-1588903761.
Useful to Consult: Wuts, P. & Greene, T. (2006). Greene's Protective Groups in Organic Synthesis (4th Edition). ISBN: 978-0471697541.

Attendance Statement

Students are expected to attend all classes. Students who are unable to attend class must seek permission for an excused absence from the course director or teaching assistant. If a student has to miss a class, he or she should arrange to get notes from a fellow student and is strongly encouraged to meet with the teaching assistant to obtain the missed material. Missed exams will not be available for re-taking.

Scientific and Professional Ethics

The work you do in this course must be your own. Feel free to build on, react to, criticize, and analyze the ideas of others but, when you do, make it known whose ideas you are working with. You must explicitly acknowledge when your work builds on someone else's ideas, including ideas of classmates, professors, and authors you read. If you ever have questions about drawing the line between others' work and your own, ask the course professor who will give you clear guidance. Exams must be completed independently. Any collaboration on answers to exams, unless expressly permitted, may result in an automatic failing grade and possible expulsion from the Graduate Program.

Technology Requirements and Support

For issues related to Canvas, please contact the Graduate Office by email at: gradprgm@scripps.edu or by phone at: 858-784-8469.

Course Grading

Grading is in accordance with the academic policies of the Skaggs Graduate School. The breakdown of grading is as follows:

- Midterm Exam: 35%
- Final Exam: 35%
- Proposal: 25%
- Video Presentation: 5%

Letter Grade	Percent	GPA	Description
A	93-100	4.00	Outstanding achievement. Student performance demonstrates full command of the course subject matter and evinces a high level of originality and/or creativity that far surpasses course expectations.
A-	90-92	3.67	Excellent achievement. Student performance demonstrates thorough knowledge of the course subject matter and exceeds course expectations by completing all requirements in a superior manner.
B+	87-89	3.33	Very good work. Student performance demonstrates above-average comprehension of the course subject matter and exceeds course expectations on all tasks as defined in the course syllabus. There is notable insight and originality.
B	83-86	3.00	Satisfactory work. Student performance meets designated course expectations and demonstrates understanding of the course subject matter at an acceptable level.
B-	80-82	2.67	Marginal work. Student performance demonstrates incomplete understanding of course subject matter. There is limited perception and originality.
C+	77-79	2.33	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
C	73-76	2.00	Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course subject matter. There is severely limited or no perception or originality. Course will not count toward degree.
P	73-100	0.00	Satisfactory work. Student performance demonstrated complete and adequate understanding of course subject matter. Course will count toward degree.
F	0-72	0.00	Unacceptable work/Failure. Student performance is unacceptably low level of knowledge and understanding of course subject matter. Course will not count toward degree. Student may continue in program only with permission of the Dean.
I		0.00	Incomplete is assigned when work is of passing quality but is incomplete for a pre-approved reason. Once an incomplete grade is assigned, it remains on student's permanent record until a grade is awarded.
W		0.00	Withdrew from the course with Dean's permission beyond the second week of the term.

- All courses will be recorded and maintained in the student's permanent academic record; only courses that apply towards the degree will appear on the academic transcript. Non-credit or audited courses will not appear on the transcript.
- 4 core courses taken for a letter grade (pass = B- or higher for a core course)
- 2 elective courses taken pass/fail (pass = A, B, C for an elective)

Course Schedule:

Date	Details
Tue Jan 5, 2021	Introduction to Retrosynthetic Analysis (Shenvi)
Thu Jan 7, 2021	Logic (Shenvi)
Tue Jan 12, 2021	Biosynthesis and Biomimicry (Shenvi)
Thu Jan 14, 2021	Vigulariol, A Case Study (Shenvi)
Tue Jan 19, 2021	Cyclopropane-Containing Compounds (Shenvi)
Thu Jan 21, 2021	Cyclobutane-Containing Compounds (Shenvi)
Tue Jan 26, 2021	Spiro Rings (Shenvi)
Thu Jan 28, 2021	Fused Rings (Shenvi)
Tue Feb 2, 2021	Bridging Rings (Shenvi)
Thu Feb 4, 2021	Attached Rings (Shenvi)
Tue Feb 9, 2021	Assignment Midterm Exam
Thu Feb 11, 2021	Five-Membered Rings (Renata)
Tue Feb 16, 2021	Medium Rings (Renata)
Thu Feb 18, 2021	Polyaromatics (Renata)
Tue Feb 23, 2021	Polyaromatics (Renata)
Thu Feb 25, 2021	Chiral Pool Synthesis (Renata)
Tue Mar 2, 2021	Chiral Pool Synthesis (Renata)
Thu Mar 4, 2021	Polyketides (Renata)
	Assignment Proposal
Tue Mar 9, 2021	Polyketides (Renata)
Thu Mar 11, 2021	Peptides (Renata)
Tue Mar 16, 2021	Hidden Symmetry (Renata)
Thu Mar 18, 2021	C-H Functionalization (Renata)