Course Syllabus – CHEM 620

Course Information

Course Number: CHEM 620 SP21
Course Name: Heterocyclic Chemistry
Term: SP 2021
Start Date: 04/05/2021
End Date: 06/25/2021
Credits: 3.0

Meeting Days / Times

Select Mondays, Wednesdays, and Fridays, 8:00-9:30am PST / 11:00am-12:30pm EST
(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	Baran	Phil	pbaran@scripps.edu
TA	Huffman	Tucker	thuffman@scripps.edu
TA	Palkowitz	Max	mpalkowitz@scripps.edu

Course Description

Basic reactivity of all heterocyclic systems will be covered as well as challenges in medicinal and process chemistry. Biosynthesis of natural products containing heterocycles will also be explored.

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: Students will gain a mastery of the reactivity and synthesis of all important heterocyclic systems.
CLO2: Students should be able to propose syntheses of unknown or unprecedented heterocyclic systems based on knowledge of fundamental heterocyclic reactivity.
CLO3: Students will become familiar with challenges and considerations in medicinal and process chemistry as well as biosynthesis of natural products containing heterocycles.

Background Preparation (Prerequisites)

N/A

Course Materials

Required: Joule & Mills (2010). Heterocyclic Chemistry. ISBN: 978-1405133005.
Required: Ishihara, Montero & Baran (2013). The Portable Chemist's Consultant: A Survival Guide for Discovery, Process, and Radiolabeling (available in iTunes).

Course Requirements

The midterm and final each constitute 35% of the final grade. Problem sets and projects combined constitute 30% of the final grade. There is also a class participation component to the grade.

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. Unapproved absences or late attendance for three or more classes may result in a lower grade or an "incomplete" for the course. 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 extra-credit quizzes 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:

- Problems Sets and Projects: 30%
- Midterm Exam: 35%
- Final Exam: 35%

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
Mon Apr 5, 2021	General Reactivity I
Wed Apr 7, 2021	General Reactivity II
Mon Apr 12, 2021	General Reactivity III
Wed Apr 14, 2021	Pyrroles
Fri Apr 16, 2021	Pyrroles/Furans/Thiophenes
Mon Apr 19, 2021	Indoles
Wed Apr 21, 2021	Indoles/Benzofurans
Thu Apr 22, 2021	Review Session #1
Fri Apr 23, 2021	Pyridines
Mon Apr 26, 2021	Quinolines/Case Studies
Wed Apr 28, 2021	Naphthyridines
	Problem Set #1
Thu Apr 29, 2021	Guest Lecture: Aaron Sather (Merck)
Mon May 3, 2021	Midterm Exam
Mon May 10, 2021	Pyryliums/Pyrones
Wed May 12, 2021	Di-, Tri- and Tetrazines
Fri May 14, 2021	1,3 Azoles
Mon May 17, 2021	1,2 Azoles
Wed May 19, 2021	1,2 Azoles
	Guest Lecture: Carolyn Dzierba (BMS)
Fri May 21, 2021	Guest Lecture
Mon May 24, 2021	Purine Case Studies
Wed May 26, 2021	Azoles/Bridging Heterocycles
	Guest Lecture: Mike Schmidt and Jeishla Melendez-Matos (BMS)
Thu May 27, 2021	Benzodiazepines
Fri May 28, 2021	Alkaloid Biosynthesis 101
Mon May 31, 2021	Memorial Day (No Class)
Wed Jun 2, 2021	Guest Lecture
Fri Jun 4, 2021	Heterocyclic Millionaire
	Guest Lecture: David Donnelly and Sam Bonacorsi (BMS)
Mon Jun 7, 2021	Review Session #2
Wed Jun 9, 2021	Final Exam