Chem 483 03 CRN 24277 and Chem 483L 01 CRN 2219 Special Topics in Industrial Chemistry  
Spring 2019

Schedule: Friday 1:00pm – 5:00pm, SSMB 300, 343

Instructor: Dr. Neal Tonks  Office: 106 New Science Center
Phone: (843) 953-7543  Email: tonksn@CofC.edu

Office Hours: Tues. 9:30–10:30 Wed. 1:00-2:00, Thur. 2:00-3:00, Fri. 11:00–12:00, or by appointment

Course Description: This course introduces the methodologies and techniques of green chemistry utilized in an industrial climate. The focus will be on solving a series of technical problems from industrial firms to develop new products, processes, or analytical procedures that have commercialization possibilities. While primarily a lecture course, the class will also spend some time in a lab environment to practice skills.

Class Learning Outcomes: This course is designed to build on all the material mastered in general chemistry, organic chemistry, advanced synthesis, advanced inorganic and instrumental analysis. The purpose of the course is to introduce undergraduates to the methodologies and techniques utilized in an industrial climate that are not part of the normal American Chemical Society curriculum. The focus will be on solving a series of small technical problems from industrial firms to develop new product, process, or analytical procedure that has commercialization possibilities. The goal will be to develop processes that minimize waste and energy input and utilize the principles of Green Chemistry. The class will consist of one hour of lecture and three or more hours of in lab work. The primary learning outcomes are:

- Design and run multistep organic reactions to produce the desired reaction product form commercially available raw materials
- Develop instrumental methods to run in process analytical tests and end product purity analysis.
- Work as part of a team of chemists, sharing responsibilities, and dividing up tasks that need to be completed over multi-week periods.
- Write up results in a reporting format suitable for an industrial lab

Future Plans: Develop relationship with IRCS and identify projects for beneficial reuse for spring 2018. This course is designed for students who have completed Chem 371 or have significant research experience, or the approval of the instructor are needed to register for this course.

Projects: The primary projects for the spring of 2018 will be as follows:

- The separation of sterol and tocopherol derivatives from biologically derived waste streams using glycolytic cleavage and extraction.

![Stigmasterol](image1.png)  
\[\text{Stigmasterol}\]

![\gamma-Tocopherol](image2.png)  
\[\gamma-\text{Tocopherol}\]
• The analysis of the diazo dye direct blue 71 using MALDI mass spec

![Chemical structure of direct blue 71]

• Setup, standardization for donated Waters HPLC with diode array module.

• Evaluation of supported catalysts for hydroformylation reactions catalyzed by supported catalysts that are normally used homogeneously

• Short term projects at the request of industrial partners

Analytical methods including specific TLC, UV-Vis and HPLC, and GCMS procedures will be developed during the course of the class.

**Class General Outcomes:** While there are specific technical objectives for this class, there are also additional goals that need to be addressed. This course is part of a larger educational experience, and as such we will attempt to align the course with the overall vision for the college, as stated in the core purpose and values of the College:

To pursue and share knowledge through study, inquiry and creation in order to empower the individual and enrich society.

**Values**

EDUCATIONAL EXCELLENCE that furthers intellectual, creative, ethical and social development through a broad range of programs centered on the liberal arts and sciences.

STUDENT-FOCUSED COMMUNITY that embraces mutual respect, collaboration and diversity for the welfare of the individual and the institution.

THE HISTORY, TRADITIONS AND ENVIRONMENT OF CHARLESTON AND THE LOWCOUNTRY that foster distinctive opportunities and relationships that advance our public mission in the city of Charleston, state of South Carolina, and the world.

Everyone in this class should acquire a sufficient understanding of industrial chemistry principles to allow success as a bench chemist in an industrial setting. A table of planned lecture topics and in lab tasks designed to let you know what topics will be discussed each day will be distributed as well as posted on OAKS. You will be asked to participate in the discussions each day. You are always encouraged to ask questions and contribute ideas to class.

**Honor Code:** Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student’s actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student’s file.
Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others’ exams, fabricating data, and giving unauthorized assistance.

Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php

**Attendance Policy:** Attendance is expected at all classes, but you will not necessarily have to work all Friday afternoons. Students are responsible for all information presented in class. It is possible and probably expected to work a flexible schedule, so you may need to work with your team to divide up experimental work over the course of a week. Any work not documented will be given a zero and averaged into the final grade, so it is important to complete all project reports.

Please note that an Absence Memorandum from the Office of Undergraduate Studies only verifies your documentation for missing a class. It does not entitle you to make up or be excused from any work, assignment, quiz, or test. You should obtain notes from a classmate, read the associated material in the text, and then come ask me questions.

**Co-requisites and Prerequisites:** Chemistry 371, significant research experience, or the approval of the instructor are needed to register for this course.

**Texts:** There will be no text book for this course, but articles from the literature will be assigned for reading and review

**OAKS:** Course material, study tools, and additional information will be provided for students on OAKS. You can access OAKS through the College of Charleston MyCharleston website. Go to https://my.cofc.edu/cp/home/displaylogin, login into MyCharleston using your system login ID and password. Once you are in the “MyCharleston system, click on OAKS icon at the top of the page, and you will be taken to the OAKS site. The course material will be under the Student tab for myCourses.
Grading

All grading will be assigned on a points scale:

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<td>Interim written team reports (weekly by one team member) and performance of in lab synthesis and analysis</td>
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<td>Team Presentation</td>
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<td>Team self-assigned grade</td>
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<td>Individual final report on instrumental method</td>
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Grading Scale:

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<td>A-</td>
<td>890-919</td>
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<td>B+</td>
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<td>B-</td>
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<td>C+</td>
<td>750-779</td>
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Final Grades: FERPA (The Family Educational Rights and Privacy Act) prevents me from posting grades and from emailing you or telling you your grade over the phone. You may consult Banner to obtain your final grade.

Snap Students: Any student eligible for and in need of academic adjustments or accommodations because of a learning disability is requested to speak with the professor during the first two weeks of classes.

Electronics Device Policy: Electronic devices that may be used in class at any time are: pagers, cell phones, radios, TV, CD, DVD, and MP3 players, personal computers, PDAs, electronic pens, calculators, and similar devices. The sound must be off unless otherwise specified by the instructor. During tests, exams, and quizzes no electronic devices are allowed to be on or in sight, unless allowed by the instructor.

Email: Email is considered an official method for communication at the College of Charleston. Official College of Charleston email accounts are automatically assigned to all students upon acceptance at the College. If a student wishes to have email redirected from their official college issued account to another email address, they may do so, but at their own risk. Having email redirected does not absolve the student from the responsibilities associated with official communication sent to his or her College account. Students are expected to check their College of Charleston official email on a frequent and consistent basis in order to remain informed of College related communications. Checking email on a daily basis is recommended.