

**Chemistry 4330/6330
Fall Semester 2019**

Lecture - Monday & Wednesday, 3:30 - 4:20 p.m., Classroom South 327
Lab - Tuesday, 9:00 am – 12:45 p.m., 242 Natural Science Center

Course Title: Advanced Synthesis

Professor: Maged Henary, 315 PSC, 404-413-5566

mhenary1@gsu.edu

Lab Assistants:

Wheeler Lovett, wlovett2@student.gsu.edu
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Office Hours: After or before lecture or by appointment.

Objectives: To learn modern synthesis, separation techniques and compounds characterization in organic and inorganic chemistry.

For additional information, see the section “General Syllabus” in the Lab Manual

Required Readings: T. Leonard, B. Lygo, and G. Procter, *Advanced Practical Organic Chemistry*, Blackie Academic and Professional, London, 1995, second edition (or equivalent); F. A. Carey and R. J. Sundberg, *Advanced Organic Chemistry, Part B, Reactions and Synthesis*, Plenum Press, New York (any edition).

Course Requirements: Bound laboratory notebook, written report from each experiment with full characterization of synthesized compounds, and submission of the samples. The report and the product should be submitted **within one week** after completion of the experiment. ***Points will be subtracted for late submissions.***

Provided laboratory manual will not be allowed during the laboratory time; all details should be written in the laboratory notebook and should be well read and understand before arriving in the lab.

Attendance Policy: ***Lectures and labs must be attended; lab make-ups are not recommended.***

It is absolutely forbidden to work in the lab without supervision.

The course syllabus provides a general plan for the course, deviations may be necessary

List of Preparations (described in detail in the Lab Manual)

1. A pentamethine cyanine dye

Chemistry: Dye synthesis

Techniques: Synthesis, crystallization, use of a rotary evaporator, determination of mp, ¹H-NMR

2. 7,7-Dichloronorcaradiene

Chemistry: Generation of a carbene, phase-transfer catalysis.

Techniques: Distillation, IR, GC-MS, ¹HNMR.

3. Ferrocene

Chemistry: Inorganic synthesis, generation of cyclopentadiene.

Techniques: Distillation, sublimation, use of a dry box, determination of mp, IR, ¹HNMR.

4. Tetraphenyltin

Chemistry: Inorganic synthesis.

Techniques: Handling of sodium and phenylsodium, crystallization, determination of mp, IR, ¹HNMR.

5. Sonogashira reaction using a microwave

“The Sonogashira reaction is a cross-coupling reaction used to form carbon–carbon bonds. It makes use of a palladium catalyst to form a carbon–carbon bond between a terminal alkyne and an aryl or vinyl halide.”

Chemistry: Palladium catalyst cross-coupling reaction used to form carbon–carbon bonds

6. 2-Chloro-4-(2-thienyl)pyrimidine

Chemistry: Nucleophilic addition, DDQ oxidation.

Techniques: Handling of organometallic reagents (**caution!**), titration of *n*-butyllithium, TLC and column chromatography, determination of mp, ¹HNMR, GC-MS.

Techniques: Handling of microwave, microwave assisted synthesis, Crystallization, use of a rotary evaporator, determination of mp, ¹HNMR

Schedule of Experiments:

Each experiment will be conducted as **instructed** in the lab lecture.

Each experiment, time table and the chemistry involved will be discussed in class.

- Labor Day Holiday on Monday September 2nd. No class.
- Last Day to Withdraw from the class on October 15th of 2019.
- Thanksgiving Holidays “the week of November 25th- 30th of 2019”.
- Laboratory Final Exam: Tuesday, November 19th, 10:00 am in the usual lab room and check out from the lab as well.
- Final Exam (ACS Format – 2 hrs.) and Location: On December 2nd. This exam will be taken in lab 242 NSC.