Fall 2026 CHEM 3380 Syllabus

CHEM 3380 – Synthesis Lab II – 3 Credit Hours

Fall 2026, August 24th, 2026 to December 7st, 2026

Meeting location for Lecture: Clough UG Learning Commons 272

Meeting location for Lab: Boggs 2-25

Instructor Contact Information

Anthony J. Rojas, Ph.D. anthony.rojas@chemistry.gatech.edu

Office hours are Wednesday, 11 am – 12 pm and Friday 9:30 am – 10:30 am in Boggs/LDL 104B. Contact me for additional meetings. I can also meet you virtually at other times if you ask.

Course Description

Welcome to Synthesis Laboratory II, an advanced course designed to elevate your skills in the art of chemical synthesis. Building upon the principles introduced in Synthesis Laboratory I, this course takes you on a journey through multi-step organic and inorganic synthesis, pushing the boundaries of your understanding and practical application of synthetic methodologies. Through multi-step organic synthesis projects, you will be challenged to design and execute complex synthetic pathways, exploring advanced techniques for the purification, isolation, and characterization of organic compounds. The inorganic synthesis component of the course invites you to delve into the intricate world of preparing coordination complexes and organometallic compounds, fostering expertise in handling air-sensitive reagents and reaction conditions unique to inorganic synthesis.

In parallel, the course emphasizes the critical role of chemical literature in informing your synthetic strategies. You will hone your skills in utilizing research papers, patents, and databases to design and plan synthetic routes, ensuring a comprehensive understanding of the field. Lastly, the incorporation of advanced spectroscopic techniques, including NMR, IR, UV-Vis, and mass spectrometry, will empower you to master the structural elucidation of synthesized compounds. This involves not only the practical application of these techniques but also the development of the ability to interpret complex spectra and correlate spectral data with molecular structures. These integrated activities collectively contribute to a rich and multifaceted learning experience, equipping you with the tools and knowledge needed to excel in the intricate and dynamic realm of chemical synthesis.

Course Learning Objectives:

Upon completion of this course, you are expected to be able to:

- Demonstrate proficiency in planning and executing multi-step organic and inorganic syntheses.
- Effectively navigate and extract information from chemical literature to inform synthetic strategies.
- Apply advanced spectroscopic techniques for the accurate characterization and structural elucidation of synthesized compounds.
- Cultivate an understanding of the challenges and nuances associated with both organic and inorganic synthesis.
- Maintain a lab notebook with details of experimental procedures, calculations, measurements, and observations; and
- Write lab reports that not only describes your work in the lab, but also introduces the backgrounds of the problem, discusses the mechanisms of the reactions, and cites scientific literatures properly.

Course Materials/Requirements

• Personal laptop or tablet computer (for electronic lab notebook)
• Lab Coat: 100% cotton or fire-resistant laboratory coat
• Goggles or Safety Glasses with Splash Guards
• BuzzCard Funds: Students must maintain a minimum balance of $30 on their BuzzCard account in case of breakage (see breakage policy).
• Combination Lock

Grading Policies

Grades are calculated based on 1070 pts (subject to adjustment), distributed as follows:

- Lab Performance and Safety Information 26 labs x 5 pts each = 130 pts
- Glassblowing = 100 pts
- Notebook Preparation = 70 pts
- Pre-Lab Quizzes = 70 pts
- Lab Reports
  - Experiment 1: TLC + NMR = 100 pts
  - Experiment 2: Photochemical Alkylation = 100 pts
  - Experiment 3: Group Theory = 100 pts
  - Experiment 4: Quantum Dots = 100 pts
  - Experiment 5: Kumada Coupling = 100 pts
  - Experiment 6: Hydroformylation = 100 pts
  - Experiment 7: Ligand Field Theory = 100 pts

Grades will be assigned as follows:

- 90% guarantees an A
- 80% guarantees a B
- 70% guarantees a C
- 60% guarantees a D

***If you email me about bumping your grade up at the end of the semester, I will bump it down instead.**

Lab Safety Information:

Before coming to the lab, information of at least three major hazards should be identified and written in the electronic lab notebook. The information should include the name of the hazardous chemical or item, and a description of its hazards. This item is graded by the TAs before the start of each experiment.

Lab Performance and Safety:

When doing experiments in the lab, students are expected to demonstrate the awareness of safety, the professionalism in communication, the understanding of chemistry, and the spirit of teamwork. The TAs keep a record of each student's behavior and give a grade for each student.

Note Taking and Laboratory Reports:

Prior to coming to the lab, students are expected to read and understand the entire experimental package. Beside the lab safety information mentioned above, students should also prepare in their electronic lab notebooks the balanced overall reaction, a table of physical properties (mp, bp, density, etc.) of reagents and expected product and calculations of any reagent amounts in measurable units (g and/or mL) and the theoretical yield, and a detailed experimental procedure.

During each lab period, students should promptly record the actual amounts of reagents used, any phenomenon or observation, any change or modification in the procedure, any measurement such as melting point or boiling point, and any thought about the experiment. Before leaving the lab, students should have the TA check and acknowledge that they have electronically signed the "honor code" section of their lab notebooks and submitted their lab notebook from LabArchives.

Laboratory reports are due according to the Course Schedule. Laboratory reports that are not submitted on time will receive a 20% deduction, and the student will have one additional week to complete and submit the assignment. An additional 20% will be deducted for each additional week that the assignment is late. Assignments must be submitted within four weeks of the due date in order to receive credit. Assignments that are not submitted within four weeks will be awarded zero points. No late assignments will be accepted after Sunday, December 5, 2026 at 11:59 pm. There will be no exceptions to this deadline. Lab Report Guidelines and the Grading Rubric can be found on Canvas.

Lab Policies

Attendance:

Comprehensive guidelines regarding class attendance and excused absences can be found in the Georgia Tech catalog. Please read through the policies in their entirety.

http://www.catalog.gatech.edu/rules/4/
http://www.catalog.gatech.edu/policies/student-absence-regulations/

Guideline summary: Attendance in all laboratories is mandatory. Unexcused lab absence will not be

made up, and the associated grades will be entered as zero. Permitted absence includes illness, personal emergency, religious observance, career advancement events, and athletic/performance activities.

If you are not feeling well in the morning of the lab day, please inform the course instructor and take rest at home. If this is the first time that you fell ill in the semester, an email to the instructor is sufficient to be excused for the lab. From the second time and onward, in addition you should also submit medical documentation to the Office of the Dean of Students and ask them to contact the course instructor for the lab to be excused. Because of the emergent nature of illness, if the Dean's email is received by the instructor before the end of the semester, the lab can be excused.

If you are ordered to quarantine or isolate by a public health official, please inform the course instructor AND ask the Dean of Students to contact the course instructor for the lab to be excused. Similarly, if the Dean's email is received by the instructor before the end of the semester, the lab can be excused.

Students may miss labs due to personal emergencies. Again, documentation of some sort should be provided to the Office of the Dean of Students who will communicate with course instructors. Please also email the course instructor as soon as you know you will miss or have missed a lab due to personal emergency.

Students who are absent because of participation in religious observances, career advancement events, and athletic/performance activities will be permitted to make up the work missed during their absence with no late penalty. Students must inform the course instructor two weeks before the planned events to have the missed lab excused. If there is uncertainty of time/date of the event, students should inform the course instructor the fluid nature of the event ahead of time and communicate with the instructor as soon as the time/date is decided.

Laboratory Admittance:

Students should arrive at the laboratory having already read the entire experiment package and having written in their notebooks detailed instructions for performing the day's experiment, including the mass or volume of reagents to be used during the laboratory period and any safety hazards for materials used during the experiment, as stated in previous sections of the syllabus.

In addition, students must be wearing the proper attire to gain admittance to the lab, as follows:
• Shoes must cover the entire foot. No flip flops, ballet flats, or open-toed shoes are permitted.
• Students must wear pants that cover to the ankle. Synthetic materials and skin-tight pants are NOT permitted.
• Safety glasses/goggles must be always worn during the laboratory period. Students must be wearing safety glasses/goggles when they enter the lab. You may wear a face shield instead of the safety glasses/goggles.
• Laboratory coats must be always worn while inside the lab and should cover to the knees.
• Long hair should be tied back.

Students arriving more than 10 minutes late for lab, including time for which they are sent away due to inappropriate attire, will not be permitted to enter the lab or make-up the experiment.

Breakage:

Each student is required to maintain a minimum $30.00 balance in their BuzzCard account in order to replace broken/lost equipment. If you need to make a purchase, present your BuzzCard to your

TA during the laboratory period. The amount will be deducted from your account, and you will be supplied with replacement equipment.

During the first week of labs, you will check in to your assigned drawer. Check the equipment list against the contents of your lab drawer. Be sure to check for any cracks or broken equipment. If you are unsure what a piece of equipment is, consult your TA. Once you are sure that you have a complete set of equipment, sign the checkout sheet and return it to your TA. From this point forward, you are responsible for maintaining the equipment in your drawer until you check out.

During the last week of labs, you will check out of your assigned drawer in consultation with your TA. Any missing or broken equipment is your responsibility to replace. Glassware should be returned clean and free of chemical residue. If you drop the course, you must check out within two weeks of dropping. Failure to check out will result in "no grade" being reported for the course, and a hold will be placed on your registration.

Academic Integrity: Students are required to sign and date all graded materials in accordance with the Georgia Institute of Technology Academic Honor Code (GTAHC, http://www.honor.gatech.edu/content/2/the-honor-code) By turning in an assignment for a grade, each student represents that he/she is the sole author of the work presented and that no act of plagiarism or academic misconduct has been performed during the preparation of the work.

Students are permitted to work together with other students who are currently taking the course and are encouraged to discuss their reasoning and thought processes to foster a positive learning environment, however, the generation of answers, phrases, lab reports, numbers, figures, and structures must be the work of each individual student. Students are not permitted to use data or lab reports, in part or in whole, from prior semesters during the preparation of their reports, as this constitutes academic dishonesty. Submission of a lab report that has elements taken directly from someone else's work constitutes plagiarism and, therefore, academic dishonesty. Cases of academic dishonesty will be handled according to the GTAHC.

Structures and figures must be constructed using ChemDraw, for which GA Tech has a site license and is no cost to the student. Copying and pasting a figure from someone else's work, including the internet, without a proper citation is considered plagiarism. Students will receive no credit for obviously copied structures and figures that do not include a proper citation. If you have any questions or concerns about these or any other Academic Honor Code issues, please consult the instructor.

- **disAbility:**

  If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

- **Student-Faculty Expectations Agreement:**

  At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

- **Changes:**

  The syllabus and course schedule are subject to change. Additional instructions for assignments will be included in each laboratory package, and additional information regarding laboratory policies, the course calendar, notebooks, laboratory reports, drawer assignments, equipment, safety, and relevant software can be found on Canvas.

Course Calendar*

*Class dates for topics are tentative and may change without notice. However, any change in dates will be announced and posted on canvas prior to the date.

**Lectures meet on Monday in CULC 127

***Please check on Canvas for the exact due