

## Syllabus: Chem244A-005 Organic Chemistry Lab II

**Prof. Yong Yan, Office: Tiernan Hall 354**

**TA: Yuchen Peng**

**Meet: 8:30AM-12:55PM Wed**

**Office hour: 1-4 pm, Wed**

**Outline of Course Contents:** There will be 6 regular experiments and the schedule of the experiments and their relative lab manuals were sent out via email. Let me know if you do not have them yet. This lab manual is the intellectual properties of NJIT. (NOTE: You shall not share this with anyone else including those students in other organic lab sections). **Please read lab safety carefully before entering the organic laboratory**, because it may result in a point deduction or failure of this lab. Chem244A introduces basic techniques and procedures in isolation, purification, and characterization of organic compounds and simple reactions used in the organic chemistry laboratory. The student will also be trained in the proper way to write a scientific laboratory report.

**Prerequisites:** Organic Chemistry(I) or its equivalents.

**Attendance and Lab Make-up:** Students must come to their registered section on time. Please note, we do not have lab make-ups available, because the materials for the designated experiment of the day will be put away as we prepare for the new lab scheduled for the next day. Late for lab class is not allowed due to the scheduled safety presentation (at beginning of the lab). Each experiment has 15% points related to attendance (including on time for class, etc.). Lab Performance (Lab cleaning, glassware cleaning etc.) and Safety.

**Safety: Safety presentation will be given at the beginning of lab, therefore, late for class is not allowed. Eye protection:** (Safety Goggles and/or safety glasses will be provided): EVERYONE must wear safety goggles at all times in the laboratory. Contact lenses may be worn in the lab if needed for therapeutic reasons, provided that safety goggles are worn over the contact lenses, the same goes with prescription glasses. Contact lenses without goggles are dangerous because splashed chemicals make them difficult to remove. If chemicals accumulate under a lens, permanent eye damage can result. If a chemical should splash into your eyes, flush the eyes with water at the eyewash fountain. Continue to rinse with water for at least 10 minutes. Goggle lenses in need of cleaning should be wiped with a moist paper towel but NOT with acetone or other organic solvents, which will partially dissolve and irreversibly cloud the lenses. **Dress code:** Wear sensible clothing in the laboratory. Loose sleeves, shorts, or open-toed shoes can be dangerous. Wear shoes that cover your feet to prevent glass cuts and wear long pants. Long hair should be tied back so it does not fall into chemicals or onto a heating device. You will be sent back home to change clothes and have a 15% points deduction taken by your TA/instructor if you are: (a) not wearing long pants, or (b) wearing sandals or other footwear that does not completely cover your feet. Repeated violations of the safety rules will have the consequence of receiving a ZERO for the related lab to Failure for this course. **Gloves:** (a) should always be worn when handling corrosive or highly toxic chemicals; (b) should usually be worn for washing glassware. No food, drink, excessive and loud talking, running in the lab, answering cell phone, etc are allowed at any time in the laboratory. No unauthorized experiment or procedure can be conducted at any time; no unauthorized personnel can be brought in the labs. If you have visitors during your lab periods, have them wait outside.

**Sequence of “things-to-do” for a lab period in a nutshell:** 1) At the beginning of each lab, show your pre-lab write-up and ask for signature. Failure to do so will result in 20% points lost regarding your pre-lab writing part. 2) Safety presentation; 3) Instructor will shortly introduce the current lab and specify the dangerous chemicals you need to pay extra attention to. 4) Proceed to conduct your experiment. You should pay full attention to what is happening and record it in the “The Procedure and Observations” section while the experiment/reaction is ongoing. 5) After finishing the experiment, complete the entire write-up, including any calculations, analysis, and discussion and turn it in to your TA before you leave for the day. If the experiment takes too long, TA or Prof. Yan might extend the due time for the lab report, i.e. take home report. The completed lab report is, in general, due by the end of the same lab period for all experiments.

## Expected Outcomes:

Upon completion of Chemistry 244A, students should be able to:

- Apply knowledge obtained in this class to problem solving and critical thinking in the laboratory.
- Utilize mathematical knowledge gained from general chemistry to perform common calculations, including mass balance, limiting reagent, and percent yield.
- Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately, using general guidelines and basic knowledge about the common hazards associated with them in an organic chemistry laboratory.
- Maintain an appropriate scientific notebook using notational and descriptive content containing MSDS information on relevant chemical reagents, experimental procedure followed, data collected, and observations made during the experimental process.
- Assemble glassware and perform common laboratory techniques, including reflux, distillation, steam distillation, recrystallization, vacuum filtration, aqueous extraction, thin layer chromatography, column chromatography.
- Predict the outcome of several common organic reaction types through a basic understanding of starting materials, functional groups, mechanism, and typical reaction conditions.
- Grasp the basic knowledge to characterize organic molecules by physical and spectroscopic means, including mp, bp, IR, NMR, GC
- Develop the skill set necessary to continue on to further Organic Chemistry Laboratory class.

## Grading/Assessment

The total points for this class is designed to 1000 points.

### Lab reports (60%): 600 points

You will turn in six lab reports, each worth 100 points, **total 600 points**.

For each lab, after the lab lecture at the beginning, your pre-lab preparation has to be signed to obtain 20 points.

Lab-work and successfully accomplishment of each experiment: 40 points

Lab results, discussions and questions: 40 points (Note: if quiz were NOT given at specific experiment)

Lab results, discussions and questions + quiz: 20+20 points (Note: if quiz were given at specific experiment)

### Safety and cleaning (15%): 150 points

Safety matters and Lab cleaning: You are expected to be prepared for lab, maintain your drawer, space and wastes appropriately, wear safety goggles/glasses and proper attire at all times while in the lab, and follow all check-in and check-out procedures. You will have points deducted for tardiness, non-completion of lab or other infractions of safety and good lab practice. Lab cleaning is also required and will be graded in this section, each and everyone of your group will be responsible for the lab cleaning in order to obtain these points.

Please NOTE that failure to follow safety code may result in failure in this class.

**Exam (25%): 250 points**

Exam is scheduled at week 13.

**Grades will be assigned as follows:**

90% and above = A; 80 – 89.9% = B; 70 – 79.9% = C; 60 – 69.9% = D; below 60% = F.

**Schedule:**

Week 1 Check in.

Week 2 Safety Lecture. & Start Caffeine Expt.

Week 3-4 Caffeine: natural product extraction, distillation (evaporation), sublimation, TLC.

Week 5-6 Pinacolone reduction: reaction, extraction, distillation, IR.

Week 7-8 Pinacol alcohol dehydration: reaction, distillation, GC.

Week 9-10 Esterification: reaction, extraction, distillation, IR.

Week 11 Aldol: reaction, UV.( Crossed Aldol Condensation)

Week 12 Aspirin synthesis: reaction, extraction, recrystallization

Week 13 Exam /Check out

**Academic Honor Codes:**

All Students are expected to critically monitor their experimental progress and record what have been done by them and/or what change has occurred/been observed during the lab period, from which they then base upon their subsequent analysis and discussion. Copying experiment data or report from others is a violation of academic honor codes, which, and the likes, bear serious consequences, from an automatic zero for the specific lab, to failing the course, to subjecting to NJIT Honor Board hearing. NOTE: cell phone and computer are not allowed in this class.