

Chem F321 Organic Chem I Lab Syllabus
University of Alaska Fairbanks, Fall 2015

Course Information

Chemistry F321, Organic Chemistry I Laboratory, 1.0 Credits (part of Chem F321)

Laboratory: Reichardt 245

Prerequisite: Chem F106X with grade of C or better.

Co-requisite: This course is part of Chem F321, Organic Chemistry I course. You cannot drop the lab without also dropping the lecture (and vice versa).

Sections	Day	Time
74020	Wednesday	2:15 – 5:15pm TA Anil Damarancha
74021	Wednesday	6:00 – 9:00pm TA Anil Damarancha
74022	Thursday	11:30am – 2:30pm TA Kristin Gagne
74023	Thursday	2:45 – 5:45pm TA Alex Tackett
74024	Thursday	6:00 – 9:00pm TA Alex Tackett
74025	Friday	2:15 – 5:15pm TA Kristin Gagne

Instructor

Thomas Green, Professor of Chemistry
Reichardt 174, Phone: 474-1559, Email: tkgreen@alaska.edu
Office Hours: Monday 2-5 pm, Tuesday 1-4 pm

Teaching Assistants

Anil Damarancha ardamarancha@alaska.edu
Kristin Gagne kgagne@arcadia.edu
Alex Tackett antackett@alaska.edu

Course Materials Required: Lab notebook for recording lecture notes and experimental data. Experiments procedures, handouts, and report forms will be available on Blackboard. In addition, videos of the RSC Interactive Lab Primer are linked for various experimental techniques.

Course Description: The lab-only component of Chem F321 (4.0 credits). A laboratory designed to illustrate modern techniques of isolation, purification, analysis and structure determination of covalent, principally organic, compounds. Lab portion will include an introduction to synthetic techniques and spectroscopy. Special fees apply.

Course Goals. Learn the following practical aspects of organic synthesis.

1. Common safety procedures.
2. Reaction methods
4. Isolation Procedures
5. Purification techniques
6. Spectroscopic and chromatographic analyses

Student Learning Outcomes

1. Know the hazards associated with common chemicals, especially those encountered in the experiments.
2. Know how to safely assemble reaction systems using glassware commonly employed in the organic laboratory. These methods include reflux, heating and cooling of reactions, and addition of reagents.
3. Know how to isolate and purify organic products using methods such as extraction, filtration, crystallization, distillation, solvent removal, and thin layer chromatography.
4. Learn the importance of stoichiometry to a chemical reaction. Learn how to assess the efficiency of a chemical reaction (percent yield and atom economy).
5. Learn the practical aspects of spectroscopic analyses of organic compounds.

Instructional Methods

1. The TAs will present short introductory lectures on the experimental procedures, techniques and theory for each lab experiment using a combination of Power Point slides and Chalkboard, providing copies of notes and reading material to the students via Blackboard. The Lab Schedule will be available on Blackboard and at the end of this syllabus.
2. Laboratory sessions will consist of conducting reactions of organic compounds and their isolation, purification and characterization.
3. Each experiment will require a "Lab Report" which will consist of Pre-lab and Post-lab components. The Pre-lab portion should be completed prior to coming to lab. If it is not completed, you will not be allowed to work in the lab for that day's experiment. Your TA will need to verify with her/his initials that you have completed the pre-lab questions.

Laboratory Safety: Laboratory safety is a major concern of all chemical laboratories but is especially important in organic labs due to the presence of flammable solvents, potentially hazardous fumes, highly reactive reagents, etc. The first lecture will deal explicitly with these hazards and the appropriate safety measures you must follow. Subsequent lectures, besides covering the theory and pitfalls of the coming weeks' experiments and perhaps helping you interpret the previous week's experiment, will also cover specific hazards that you may encounter. Please attend these lectures and be prepared for the lab by doing any assigned readings and completing the Pre-lab exercises before coming to lab. If you are not prepared for lab you may be asked to leave.

Grading

Category	Points
Lab Reports	35 pts x 9 = 315 pts
Notebook	50 pts
Total Points	365 pts

*The total points possible for Chem 321 is 1000 pts. The lab component is 25% of 250 pts. Thus the points will be normalized to 250 pts total and will be incorporated into the overall grade for Chem F321 (4 credits). For example, if you obtain 320 pts out of 365 pts, you will receive for the class $320/365 \times 250 = 220$ pts for the lab in the overall calculation of the Chem 321 grade.

Notes and Policies:

1. Class attendance is expected and role will be taken.
2. Make-up labs will be allowed with a legitimate excuse. Excuses must be approved by the instructor.
3. All labs must be completed to receive a passing grade.
4. Late reports are penalized 10% per day up to 1 week and then not accepted.

- You will often be asked to work with another student in pairs. You are expected to contribute equally with your partner in carrying out the experiment. Each student is required to complete and submit a lab report.
- Cleaning up your work space is required! Points will be deducted for failure to wash your dishes and clean your bench after lab is complete.

Lab Schedule – see Blackboard for specific Experimental Procedures and Report Forms.

Experiment	Week of	Concepts/Techniques
1. Safety, Fermentation of Blackstrap Molasses (35 pts)	Sept 7,14	lab safety, fermentation, density, simple and fractional distillation,
2. Liquid CO ₂ Extraction of orange peel (35 pts)	Sept 21	phase diagrams, extraction, natural products
3. Extraction of Caffeine from Tea	Sept 28 Oct 5	acid-base chemistry, extraction, melting point
4. TLC and Intermolecular Forces (35 pts)	Oct 12	thin layer chromatography, H-bonding, polarity, functional groups
5. SN1 reaction; kinetics of hydrolysis of t-butyl chloride	Oct 19	mechanism, kinetics, titration
6. Bromination of stilbene (35 pts)	Oct 26	electrophilic addition, melting point, stereochemistry, reflux, vacuum filtration
7. Synthesis of adipic acid from cyclohexene (35 pts)	Nov 2, 9	phase transfer catalysis, mild oxidation, crystallization, vacuum filtration, melting point.
8. Hydride reduction of camphor (35 pts)	Nov 16	reduction, stereoisomers by NMR spectroscopy orbital theory
9. Aqueous Analogue of Grignard Reagent	Nov 30	organometallic chemistry, NMR and IR spectroscopy.
10. Makeup Experiments	Dec 8	Please schedule missed labs with your TA.

Due Dates for Lab Reports and Homework

Experiment	Due Date (Week of)
Fermentation	Sept 21
CO ₂ extraction	Sept 28
Caffeine	Oct 12
TLC	Oct 19
SN1 Hydrolysis	Oct 26
Stilbene	Nov 2
Adipic Acid	Nov 16
Camphor	Nov 30
Grignard Analogue	Dec 8

Disabilities Services: The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. Students with documented disabilities who may need reasonable academic accommodations should discuss these with me during the first two weeks of class. I will work with the Office of Disabilities Services (*208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities. You will need to provide documentation of your disability to Disability Services.

Veteran Support Services.

Walter Crary is the Veterans Service Officer at the Veterans Resource Center, 111 Eielson Building. 474-2475. (wecrary@alaska.edu) Fairbanks Vet Center 456-4238. VA Community Based Outpatient Clinic at Ft. Wainwright is 361-6370.

Amending this Syllabus: Amendments and changes to the syllabus, including evaluation and grading mechanisms, are possible. The instructor must initiate any changes. Changes to the grading and evaluation scheme can be made before the add/drop date without a vote, but after that date must be voted on by the entire class and approved only with unanimous vote of all students present in class on the day the issue is decided. The lecture schedule and reading assignments (Daily Schedule) will not require a vote and may be altered at the instructor's discretion. This Daily Schedule can be found on Blackboard. Grading changes that unilaterally and equitably improve all students' grades will not require a vote. Once approved, amendments will be distributed in writing to all students via Blackboard.