**CHEMISTRY 3514: Organic Chemistry I**

LABORATORY SYLLABUS

**FALL 2017**

**Professors:** Dr. Jerry Fong (PHS 305), 607-587-3692, fongjd@alfredstate.edu

Dr. Stephanie Rugg (PHS 302), 607-587-3676, ruggsc@alfredstate.edu

**Course Website:** http://web.alfredstate.edu/faculty/fongjd/OrgChem1.htm

**Required Materials:** Lab Notebook (Carbon Copy or Composition notebook)

Lab coat

Safety Glasses

**Suggested Materials:** “Darling Molecular Model Kit” (will be required in Organic II)

http://www.acdlabs.com/downloads (download Chemsketch 11.0 - *free)*

**Lab Learning Outcomes:**

1) Successfully perform the basic organic lab techniques of recrystallization, melting point determination, solvent extraction, distillation, TLC and column chromatography, and both IR and GC characterization.

2) Independently and successfully carry out a multi-step synthesis and characterization of a target organic compound given a standard organic reaction kit and a standard organic preparatory procedure written in a fashion similar to your lecture text.

**Grading:**

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Points each | Total Points | % of Total |
| Technique Labs (7) | 35-45 | ~280 | ~50 % |
| Practicuum | 50 | 50 | ~ 9 % |
| Synthesis Labs (2) | 100 | 200 | ~36 % |
| Nail exercise | 25 | 25 | ~5 % |
| Total |  | 555 |  |

Laboratory is 25% of the course grade.

**Flunk the Lab; flunk the Course**.

**Lab Reports:**

* Technique Labs: You will turn in your primary lab notebook as a “lab proof” along with the post-lab questions on the Monday following the lab.
* Synthesis Labs: You will turn in your primary lab notebook the Monday following the completion of the lab along with the post lab questions. Additionally, a **formal, typewritten, theory report** is required. Grading rubrics for each lab will be made available.

**Practicum:**

Using only your lab notebook, you will randomly select one of the technique experiments carry out an analysis for a selected compound.

**Attendance:**

No make-up labs are allowed unless by express consent of the instructor. An unexcused lab absence converts to a `0’ (zero) for that lab. Two unexcused lab absences converts to an F for the **entire** course. We do not accept late labs. Late labs earn zeros (0).

**Safety:**

* Safety glasses/goggles/side shields are required during the entire lab (no contacts)
* No open-toed shoes or sandals!
* Long pants & Lab coats are required.
* No eating, drinking or smoking in lab!
* Know locations and how to operate the following

○ Fire extinguisher ○ Fire blanket ○ Shower ○ Eye wash

* Report all accidents to Doc Fong or Dr. Rugg immediately.

**Lab Philosophy:**

Students often view Organic Chem lab as a kind of cooking class where you show up, follow the printed directions and hope the final `cookies’ don’t burn, explode or inadvertently become bagels. This leads to the common notion that synthesis is about 95% luck and 5% dumb luck. If you leave this course holding that opinion you’ll have entirely missed the point.

Consistently successful, efficient high yield/purity synthesis happens when you simultaneously master the underlying chemical mechanism that leads to the product (e.g., you know the `theory’) while at the same time firmly grasping how the described preparative techniques, conditions and individual procedures act to produce the each step (e.g, know the `practice’).

Knowledge is power in organic synthesis.

For the record, synthesis also includes an element of serendipity (okay, dumb luck). Essentially, you are trying to get ~1023 cranky, back-sliding electrons to perform a specific set of hop-skip-and-jumps at your command. Hence, variability in synthetic outcome is natural. However, chance favors the prepared mind. Good laboratory workers adjust and respond to what they see based on a firm knowledge of what to expect. They also exude a combination of preparation, deft organization, verbal acuity, independence of action and creative focus that-like good writing- can be recognized but only vaguely explicated. Bad laboratory workers exude the opposite traits. That too, is easily recognized and is reflected in crap yields and abysmally written reports.

**Academic Integrity:**

Absolute academic integrity is expected of all students and faculty members of Alfred State. Students must in no way misrepresent their work, fraudulently or unfairly advance their academic status, or in any way help other students commit acts of academic dishonesty, and faculty members must fairly evaluate academic work. This code defines rights and responsibilities relating to academic integrity and outlines the procedure for dealing with allegations of academic misconduct. It also outlines the procedure for student academic grievances against faculty members. This code shall be communicated to the college community by being included in the faculty handbook, the college website, and student and faculty orientation information. The college website contains the most current version of the policies and procedures governing the college's academic integrity code. (http://www.alfredstate.edu/academic-integrity-code)

**Students with Disabilities:**

Alfred State is firmly committed to providing an equal opportunity for a college education to all qualified students. The philosophy of the Office of Student Disability Services reflects the interpretation of Section 504 of the Rehabilitation Act of 1973 in terms of providing reasonable and individualized accommodations. We welcome students with disabilities into our campus community and our programs. In this spirit, we are committed to providing reasonable opportunities to qualified students to participate in campus programs and activities. We recognize that the needs for each person with a disability are unique; therefore, services and/or accommodations are provided on an individualized basis. Students with disabilities are encouraged to participate in all aspects of campus life. Self-identification is essential and self-advocacy is encouraged. For further information, please visit the Office for Disability Services Website.

**Prelab Requirements**

* Read the lab modules located on the course website, and prepare for the lab quiz
* Set up the lab notebook, including the “Before Lab” information

**Lab Proof Format for Technique Labs**

|  |  |
| --- | --- |
| Before Lab | * + Title, date, page numbers   + Compound structure, MP (melting point), and MM (molar mass)   + Purpose: goal and a little bit of theory (one paragraph) |
| During Lab | * Procedure and Observations (past tense, detailed, picture of setup, sign and date each page) * Results (melting point range, % recovery, IR and GC analysis) * Conclusion * Post lab questions (on worksheets) |

**Grading Rubric for Technique Labs**

|  |  |
| --- | --- |
| Prelab quiz | 3 |
| Industry format (see website for example) | 3 |
| Purpose & theory | 4 |
| Procedure & observations | 8 |
| Results | 8 |
| Conclusion | 4 |
| Post lab questions | 5-10 |
| **Total** | **35-40** |

**Laboratory Experiment Schedule: CHEM 3514 Fall 2017**

|  |  |  |
| --- | --- | --- |
| **Week #** | **Dates** | **Lab Topic** |
| 1 | 8/31 | Check-in, Safety, Researching |
| 2 | 9/7 | Re-crystallization & Melting points |
| 3 | 9/12 | Instrumental Methods: IR, GC |
| 4 | 9/21 | Thin Layer Chromatography |
| 5 | 9/28 | Column Chromatography |
| 6 | 10/5 | Stereochemistry & Polarimetry |
| 7 | 10/12 | Liquid-Liquid Extraction |
| 8 | 10/19 | *Continued* |
| 9 | 10/26 | Distillation, Refractive index |
| 10 | 11/2 | **Practicum & “Two Nail Puzzle”** |
| 11 | 11/9 | Synthesis of n-butyl bromide (Handout) |
| 12 | 11/16 | *continued* |
| *13* | *11/23* | *Thanksgiving Break* |
| 14 | 11/30 | Elimination of dibromo-cinnamic acid |
| 15 | 12/7 | *Continued* |

\*We use a Spectrum 1 FTIR with ATR head and HP 6890 GC (30 m HP-1 capillary column +FID detector)\*