SYLLABUS[1]

CHEM 2125 – ORGANIC CHEMISTRY LABORATORY II

Spring 2017

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Office Hours: Friday, Noon – 1=00 PM.

COURSE PREREQUISITES: CHEM 2323 & 2123 (Organic Chemistry I lecture and laboratory)
COURSE COREQUISITES: CHEM 2325 (Organic Chemistry II lecture)

COURSE DESCRIPTION: This course provides the skills necessary to conceptualize, design, and execute organic experiments with an emphasis on syntheses. Students gain exposure to representative types of reactions and mechanisms, spectroscopy, and structure determination.

LEARNING OBJECTIVES AND OUTCOMES

- Perform representative reaction types, either in isolation or as part of a synthesis. These include, but are not limited to, oxidations, reductions, aromatic substitutions, and select name reactions.
- Use spectroscopic techniques such as IR and NMR to characterize organic substances.

TEXTBOOK: Pavia, Lampman, Kriz, and Engel. *A Microscale Approach to Organic Laboratory Techniques.* **5th ed**. Thomson Brooks/Cole, 2013. Please refer to the publisher's website for ISBN and price information. Access to the OWL Lab Skills is NOT required.

> ***NOTE****: Previous editions of the textbook will not do for this course. You are NOT required to bring the textbook to class, so you can share a copy with other students if necessary.*

SUPPLIES: The combination padlock is required for check-in during the first lab meeting (see calendar on next page). The rest of the items are required for the second lab meeting and thereafter.

- **COMBINATION PADLOCK** (Only one per group). Can be obtained from the bookstore, or from area retail outlets such as the off-campus bookstore, Tom Thumb, Target, Staples, and Home Depot.
- **APPROVED SAFETY GLASSES**:
  - **Must have the Z87 code engraved on them**.
  - **The spectacle type is recommended over the goggle type**. Spectacles look like regular glasses. They are comfortable and can be worn over prescription glasses. They can also be made to prescription at certain retail outlets.
- **HARDBOUND NOTEBOOK** with duplicate sheets (carbon copies) for prelabs.
- **GLOVES**: Although disposable gloves are available in the lab, they are not chemical resistant and can tear easily. In addition, they can trigger allergic reactions. Having your own gloves is recommended. Dishwashing gloves are adequate for this lab.
- **PROPER ATTIRE**: Students working in chemistry labs must have a covered torso, and

1 *The descriptions and timelines presented in this syllabus are subject to change at the discretion of the Professor.*

wear long pants and closed shoes. The following are unacceptable: sleeveless garments, tank tops, shorts, sandals, open shoes, Capri pants, etc.

- **ITEMS OF PERSONAL USE** (for cleaning, labeling, etc.): Towel, Sharpie marker or pen, and masking tape.

CLASS SCHEDULE – Org. Lab II – Spring 2017

NOTE: There are no labs the first week of class. All organic lab operations begin on the second week.

DATES	EXPERIMENTS
Jan. 17 – 23	Introduction & Check-in.
Jan. 24 – Feb. 6	Exp. 33 A: Grignard Reaction (two period lab)
Feb. 7 – 13	Exp. 42: Preparation of Benzocaine
Feb. 14 – 20	Exp. 65: Esterification of Vanillin
Feb. 21 – 27	Exp. 60: Aldehyde Disproportionation Dry lab, no prelab required. Read the class notes.
Feb. 28 – Mar. 20	Exp. 45 A,B: Synthesis of Sulfanilamide (two period lab)
Mar. 21 – 27	Exp. 32 C: Prep. of Benzilic Acid
Mar. 28 – Apr. 3	Exp. 39 B: Prep. of a diene using the Wittig Reaction
Apr. 4 – 10	Exp. 37: Aldol Condensation Reaction ***Glassware & drawer cleanup in preparation for check-out***
Apr. 11 – 17	Final exam & Check-out

DETAILED DESCRIPTIONS, READINGS, & ASSIGNMENTS

CHECK-IN – The check-in procedure takes place in the lab. Students will form groups of two. **Each group must provide a combination padlock**. No drawers can be assigned without combination padlocks.

For all experiments you are strongly encouraged not only to do the assigned readings, but also to bring the class notes to the lab. They contain useful tips and possible modifications to the experimental procedure.

EXP. 33A – PREP. OF TRIPHENYLMETHANOL. Grignard reactions & carbon nucleophiles in organic synthesis.

- Readings: Posted notes and p. 305 – 312.
- Suggested study questions from the textbook (see note below): # 1, 3, 5(a,b,d) on p. 315.

NOTE: The suggested study questions will better prepare you to understand the experiment and to answer the post-lab questions.

EXP. 42 – PREPARATION OF BENZOCAINE. Local anesthetics, controlled conditions esterification, use of high field NMR for product characterization.

- Readings: Posted notes and p. 364 – 371. Note: the quiz for this experiment may include questions about the introductory essay (*Local Anesthetics*).
- Suggested study questions from the textbook: # 1 – 4, p. 371.

EXP. 65 – ACID AND BASE CATALYZED ESTERIFICATION OF VANILLIN. Use of the chemical literature and NMR to solve a structure proof problem.

- Readings: Posted notes and p. 568 – 570.
- Obtain the following article and read it: Kochlar, S.K. *et. al. J. Org. Chem.,* **48**, 1765 – 1767 (1983).
  Please consult your instructor or a reference librarian if help is needed.

EXP. 60 – ALDEHYDE DISPROPORTIONATION REACTIONS. Use of critical thinking and spectral data to identify reaction products. This is dry lab and there is no prelab required. However, reading the posted notes ahead of time will enable to answer the post-lab questions quicker and more efficiently.

- Readings: Posted notes and p. 548 – 550.
- Suggested study questions from the textbook: None.

EXP 45 A,B – PREPARATION OF SULFANILAMIDE. Multistep synthesis, protecting groups, electrophilic aromatic substitution.

- **Please inform your instructor if you are allergic to sulfa drugs**.
- Readings: Posted notes and p. 389 – 396. Note: the quiz for this experiment may include questions about the introductory essay (*Sulfa Drugs*).
- Suggested study questions from the textbook: # 3, p. 396.

EXP. 32C – SYNTHESIS OF BENZILIC ACID. Organic oxidations and reductions, skeletal rearrangements.

- Readings: Posted notes and p. 301 – 304.
- Suggested study questions from the textbook: # 1, 2(a,c) on p. 304.

EXP 39B – PREPARATION OF CONJUGATED DIENE. Use of the Wittig reaction in alkene synthesis,
organic mechanisms involving phosphorus.

- Readings: Posted notes and p. 347 – 349, and 350 – 352. Note: The TLC part of this experiment will not be performed.
- Suggested study questions from the textbook: # 1, 2 (p. 354).

EXP. 37 – ALDOL CONDENSATION. Crossed aldol condensation, preparation of benzalacetophenones.

- Readings: Posted notes and p. 337 – 340.
- Suggested study questions from the textbook: # 1, 2, 4(a, b, c) on p. 340.

CHECK-OUT. ALL students must be present for check-out. Anyone missing will continue to be responsible for the equipment in their drawer. No check-out is allowed prior to this date unless you drop the course.

GRADING POLICY

The final grade for this course is calculated as follows. All work graded on a 100 point scale.

- Prelabs (individual) 30%
- Post-labs (group) 30%
- Quizzes 20%
- Final exam 20%

INDIVIDUAL PRELABS are required to perform every experiment and are due prior to the beginning of the lab session. Please refer to the guidelines for writing prelabs posted in *eLearning*.

POST-LABS are a group effort and consist of a form to be filled out and turned in following completion of the experiment. The grade obtained applies to all members of the group. However, individual members can lose points for poor technique (see below).

LABORATORY TECHNIQUE & SAFETY AWARENESS. Students will be individually evaluated by the instructors on their technique and on safety awareness for each experiment. Points will be deducted from the post-lab for students who:

- show a lack of preparation or lack of knowledge of basic procedures and calculations,
- disregard safety rules (for instance not wearing eye protection or proper attire in lab),
- do not carry their fair share of the group's work,
- leave experiments unattended or leave the lab for long periods of time,
- leave the lab for good before the group concludes the experiment (this earns a grade of zero for the experiment),
- or any other types of unprofessional or unsafe behavior.

QUIZZES. Quizzes are given during the prelab lecture period and are intended to ensure that students are prepared before they attempt to perform the experiment. Therefore, the following applies:

- Students arriving to class after the quiz has started but before it ends may take the quiz but will not be granted any time extensions.
- Students arriving after the quiz has ended may not take the quiz. They can still perform the experiment provided they produce the corresponding prelab.

FINAL EXAM. The questions in the final exam are based on the theory and technique of the experiments, and on the quizzes. A study guide will be posted the week prior to the final exam.

LETTER GRADE ASSIGNMENT TABLE (based on final percent grade after round-off)

95 - 100 = **A**+	80 – 84 = **B**+	65 – 69 = **C**+	50 – 54 = **D**+
90 – 94 = **A**	75 – 79 = **B**	60 – 64 = **C**	45 – 49 = **D**
85 – 89 = **A**-	70 – 74 = **B**-	55 – 59 = **C**-	40 – 44 = **D**-

POLICY REGARDING MISSED WORK (experiments, prelabs, or quizzes)

1. The first missed experiment, prelab, or quiz will be dropped (they don't have to match). The final exam cannot be dropped. Students are encouraged to use this option before requesting a makeup lab.

2. TWO-PERIOD EXPERIMENTS
    a. Missing the first period counts as missing the entire experiment.
    b. Missing only the second period results in a 50 point deduction from the experiment grade.

3. MAKEUP EXPERIMENTS
    a. Students can request a makeup experiment if the reasons are covered by university policy or state law (see below).
    b. Students who wish to make up an experiment for reasons other than those covered by university policy or state law will not be able to drop any grades. Only one request can be granted under this policy.

EXEMPTIONS GRANTED BY UNIVERSITY POLICY & STATE LAW

Students can be granted exemptions from certain rules (e.g. waiving an absence or making up an experiment) if the following conditions are met:

1. The reasons are covered by university policy or state law.
2. Advanced notice is given to the instructor when possible.
3. Proper documentation is provided.

Examples of reasons covered under this policy are: **military duty, jury duty, major illness, hospitalization, medical procedures, and participation in university-sponsored events**.

Examples of reasons **NOT COVERED** under this policy are: **personal engagements such as travel and social events, common emergencies such as minor accidents or illness, and any reasons that cannot be properly documented**.

UTD SYLLABUS POLICIES AND PROCEDURES WEBPAGE – Use this link to access information regarding such matters as:

- Incomplete grades policy
- AccessAbility services
- Student conduct
- Grievance procedures
- Religious holy days
- Withdrawal from class
- Student resources (Peer tutoring, PLTL, SI, etc.)
- Sharing confidential information
- Campus carry