

1st Semester Organic Lab Syllabus - CHEM 3511

- | Chemistry 3510 - Organic Chemistry (3 credit hours lecture + 1 credit hour lab)
Chemistry 3511 - Organic Chemistry Lab Syllabus
Semester: Fall 2009

- | Instructor - Dr. F. J. Matthews
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- | Course Description:
CHEM 3510 (lecture) and CHEM 351L (lab) represent a single course and must be taken concurrently. A course grade, determined using 75% lecture grade and 25% lab grade, will be assigned at the end of the semester. Students who choose to repeat organic lecture or lab will be required to repeat both as they represent corequisites.

- | Laboratory Course Description:
Study of functional groups (alkanes, alkenes, alkynes, alkyl halides, aromatic compounds) and their reactions, structure determination, stereochemistry, and spectroscopy.

- | Corequisite: [CH3510](#)

- | Laboratory Times:
Tuesday - 8:00-11:00am
Tuesday - 11:10am-2:10pm
Tuesday - 2:20-5:20pm
Thursday - 11:10am-2:10pm
SSC E305/D319 (Briefing)
SSC D307 (Laboratory Work)

- | Laboratory Texts:
Matthews, F.J. "Organic Chemistry Laboratory Experiments, Including Identification Techniques, Spectroscopy, and Supporting Spectral Data"; 21st edition; Clarksville TN, August 2009.
Zubrick, J.W. "The Organic Chem Lab Survival Manual - A Student's Guide to Techniques"; 7th edition; J. Wiley and Sons: New York, 2008.
"Student Lab Notebook with Permanent Binding - Top or Side Bound - 100 Carbonless Duplicate Sets"; Hayden McNeil Specialty Products.
Lide, D.R., Ed. "CRC Handbook of Chemistry and Physics"; CRC Press (purchase from [Amazon.com](#), [BarnesandNoble.com](#), or other online stores; Student Edition is acceptable if hardcover version).

- Other Required Materials:
Students will be required to purchase two hard-covered 1" three-ring binders (one for the submitted lab report carbonless copies, lab data sheets, and spectral data sets; the other for the returned lab report carbonless copies, lab data sheets, and spectral data sets), a hole punch (or three-hole punch) and a stapler, and a set of splash-proof laboratory goggles (approved type are available in the bookstore).

- Objectives:
(1) To introduce the student to organic chemistry laboratory techniques used to perform reactions, purify organic products, and identify the purity and chemical identity of products. Students will also learn how to

manipulate data for mathematical calculations of reactant recovery, product yield, and product purity.

(2) To provide the student with a firm foundation in organic laboratory techniques so that the student may pursue experimentation in other chemical and scientific laboratories.

(3) To provide the student with a firm understanding of laboratory safety that can be used in all future laboratory experiences.

- Topics to be Covered:

A tentative list of laboratory experiments ([Organic Lab Schedule](#)) will be provided. This list will include experimental techniques and reactions in which these experimental techniques may be utilized. Several methods of spectroscopic identification of organic structural analysis will be studied.

- Out of Class Work:

Students are expected to read assignments from the texts prior to class (see reading assignments on lab experiments). All techniques and experimental procedures should be thoroughly studied prior to lab. Students must have the first six items listed below (1-6) written in their lab notebook before coming to lab class; students will only need to fill in the table of data (6) and record observations (7) during lab class, and then write the discussion of results (8) and conclusions (9) sections when the lab experiment is completed.

- Graded Materials:

A short test will be given at the beginning of each lab period. This quiz will cover the experiment performed the previous week and the experiment to be carried out that day (readings from Matthews and Zubrick). Students who arrive late will not be allowed to take the quiz. There will be no makeup quizzes, however, students will be allowed to drop their lowest quiz grade.

Each student is required to keep an individual laboratory notebook. Write-ups should be in either black or blue ink (be consistent) in an approved notebook. All laboratory data must be kept in this notebook (no other note sheets will be allowed in lab). The format of each experimental write-up should include the following items:

- 1) Title, experiment number, and date
 - 2) Purpose
 - 3) Chemical structure / Balanced chemical equation and mechanism (for reaction experiments)
 - 4) Outline of procedure
 - 5) Diagram of apparatus
 - 6) Tabulated form of all measured data
 - 7) Observations
 - 8) Discussion of results
 - 9) Conclusions
- (see [Writing the Lab Notebook](#) for detailed explanations)

Students must have the first six items (1-6) written in their lab notebook before coming to lab class; students will only need to fill in the table of data (6) and record observations (7) during lab class, and then write the discussion of results (8) and conclusions (9) sections when the lab experiment is completed.

A three-ring binder containing the carbonless copy of each lab report, lab data sheets, and spectral data sets* are due by 3:00 pm on the day after lab (Wednesday/Friday) following the completion of each experiment. The student's name, lab section (day of week and lab start time), and current semester of study (e.g. Fall 200#) must be on the outside front cover of the three-ring binder in large, readable letters. These will be returned following grading and should be retained by the student in a second three-ring binder throughout the remaining portion of the semester.

*Each student is required to submit individual spectral data sets (GLC, GCMS, IR, PMR, CMR) for lab

experiments that include spectral analysis. These must be submitted in a hard-covered 1" three-ring binder in the order GLC, GCMS, IR, PMR, CMR (as listed in the lab analysis section of the appropriate experiment). Submission format for each is listed at the end of the appropriate appendix in the "Organic Chemistry Laboratory Experiments, Including Identification Techniques, Spectroscopy, and Supporting Spectral Data" book. Each experiment's spectral data sets should be separated using a divider page which is labeled at its edge; in addition, the individual spectral data sets within each experiment should be separated using labeled divider pages or "tape flags". The spectral binder is due by 3:00 pm on the day after lab (Wednesday/Friday) following the completion of each spectral analysis experiment.

Laboratory products are due following the completion of each experiment and must be properly labeled (see below).

A laboratory exam will be given during the final lab meeting (December 8) and will cover laboratory reactions and mechanisms, experimental procedures and techniques, and background material.

Students will be assigned a set of lab desk drawers with equipment for which they will be responsible from check-in (first lab) to check-out (final lab). Any broken or missing equipment that must be replaced during the semester will be subtracted from the student's "Lab equipment" points based on the current cost of equipment replacement using the most recent Fisher Catalog or similar equipment catalog currently utilized by the APSU Chemistry Department. The number of points subtracted from the starting total of 20 points will be based on the following scale: 1 point = \$5.00 current catalog replacement cost.

- Grading Scales:

Lab Grade

Lab participation - 3 pts per lab

Lab quizzes - 4 pts each

Lab notebook - 8 pts per write-up

Spectral data - 8 pts per spectral set

Products - 2 pts each

Lab exam - 20 pts

Lab checkout - 3 pts

Lab equipment - 20 pts

Lab average = total pts earned / total pts possible

Course Grade

Lecture grade (75%) + Lab grade (25%) = Course average (100%)

Letter Grade from Numerical Average

A ≥ 90.00 , B ≥ 80.00 , C ≥ 70.00 , D ≥ 60.00 , F < 60.00

- Labeling Laboratory Products:

All samples must be properly labeled before being submitted for grading. A properly labeled sample should contain the following information:

submitter's name(s)

hood #

sample name

experiment number

date & class (beginning) time

g (experimental)

% recovery/yield (experimental & typical class value)

mp, bp, microbp, and/or refractive index (experimental & theoretical)

GLC, MS, IR, and/or NMR data (see lab text for specifics)

- **Attendance Policy:**
Students are expected to be present and on time for all laboratory meetings. No make-up labs will be permitted for unexcused absences. A student who is absent and has an acceptable excuse must make-up the laboratory experiment the Tuesday/Thursday following their return to classes; this make-up experiment must be performed in one of the other organic laboratory sections. All excuses for missing lab must be submitted in writing at the next class (lecture or lab) which the student attends. A student who accumulates more than one unexcused absence from lab may be dropped from the course and given a grade of F.
- **Laboratory Behavior:**
The laboratory is expected to be a learning environment, therefore it is expected that students will be quiet, attentive, and courteous. Normal laboratory rules are followed, including no drinking, eating, smoking (yuck), horseplay, or yelling is allowed. Students are expected to follow all safety rules listed on the General Chemistry Safety and Laboratory Rule sheets. Students must wear safety goggles at all times while in the laboratory (NO EXCUSES ARE ACCEPTABLE FOR NOT WEARING YOUR SAFETY GOGGLES!!!). Pagers, cell phones, or other electronic devices must be turned off while students are in class.
- **Drop/Withdrawal Policy:**
Students who choose to withdraw from organic lab must also withdraw from organic lecture. Students must obtain the instructor's signature to withdraw from CHEM 3510/3511 after the "APSU Automatic W Deadline" date.

October 9 - Friday - APSU Automatic W Deadline

October 30 - Friday - Dr. Matthews' Automatic W Deadline

November 9 - Monday - APSU/Dr. Matthews' Last Day to Drop a Course

- **Educational Goals:**
The general objective of the University is to produce educated men and women equipped to use their abilities productively and wisely. The curricula of the University are routes to intellectual maturity and means to the development of ideas, insights, values, and competencies which form a permanent personal capacity for thought and action. The University does not claim that it will develop educated men or women. It does claim it will provide the opportunity and the favorable conditions for students to construct their own education and to acquire the means of making self-education the rewarding enterprise of a lifetime, enabling them to become effective agents of social change.
Given this opportunity at the University in this course, each student should develop, at an appropriate level:
 - (1) skills of inquiry, abstract and logical thinking, and critical analysis;
 - (2) literacy in writing, reading, listening, and speaking;
 - (3) the ability to understand and use numbers and statistics;
 - (4) an understanding of the scientific method;
 - (5) a concentration in a discipline in order to enter a chosen profession, undertake advanced study, or develop an avocation.These are the marks of an educated man or woman, and it is the aim of the University to challenge and assist in their attainment. To this end Austin Peay State University is committed to the integration of human learning functions and to an orderly educational sequence.
- **Minor Policy:**
According to APSU policy #3:032, minors (defined as those under the age of 18) are not allowed in classrooms. While recognizing that extenuating circumstances occur and make it difficult for some students to attend without bringing children with them on occasion, University policy will be enforced and thus any request for a child to attend lecture or lab classes will be denied. In addition, be aware that minors are not allowed in academic labs, computer labs, science labs, or the library. Further, children cannot be left in halls outside classrooms. Please be aware that the policy on unattended minors is for the purpose of ensuring that our classrooms are conducive to learning and for the safety and protection of minors. For additional information on

minors on campus, contact the Office of Student Affairs in the Morgan University Center.

- Alarms:

Class (lecture or lab) will be temporarily suspended during a building alarm and students are expected to leave the building in an orderly fashion; class will resume 5 minutes after the alarm ends and safe return is allowed into the building. Class roll will be called and any student who has not returned at that time will receive an unexcused absence. If less than 10 minutes (according to classroom clock) of class time is remaining at the alarm's end, class will be suspended for that day; if in doubt, return to class.