

Spring 2019

CHEM 244A-006: Organic Chemistry II Lab

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Chemistry: *Spring 2019 Course Syllabus*

NJIT Academic Integrity Code: All Students should be aware that the Department of Chemistry & Environmental Science (CES) takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

COURSE INFORMATION

Course Description:

This course offers a comprehensive introduction to basic modern organic chemistry and will be of interest to students majoring in chemistry, biochemistry, biology, and related sciences. Students taking this course will already have been introduced to the principles of organic structure (alkanes, alkenes, alkynes, alcohols, carbonyl compounds and stereochemistry), and the basic principles of infrared (IR), nuclear magnetic resonance (NMR) and mass spectroscopy. This course will build on these general principles and will include details on the synthesis and reactions of alcohols, aromatic compounds, aldehydes, ketones amines, carboxylic acids and derivatives and phenols. In addition, the course will include sections on carbohydrates, amino acids and nucleic acids. Organic chemistry is a multifaceted science that is central to other related sciences including biochemistry and medicinal chemistry. This course introduces students to the language and theoretical foundations of organic chemistry.

Number of Credits: 2

Prerequisites:

CHEM 243 Organic Chemistry I / Co-requisite: CHEM 244 Organic Chemistry II

Course-Section and Instructors

Course-Section	Instructor
CHEM 244A.006	Dr. Ngozi Onyia

Office Hours for All Chemistry & Environmental Science Instructors: [Fall 2018 Office Hours and Emails](#)
By Appointment

Required Textbook:

Title	CHEM 244A, Organic Chemistry II Laboratory Manual
Author	Edgardo Farinas, Chaudhery Hussain and Yogesh Gandhi
Edition	

Publisher	
ISBN #	

University-wide Withdrawal Date: The last day to withdraw with a **W** is Monday, April 8, 2019. It will be strictly enforced.

Learning Outcomes:

- Demonstrate a general knowledge of the basic area of organic chemistry and have the ability to apply it in a problem solving environment.
- Develop fundamental critical thinking skills, including pattern recognition and analogous reasoning in basic organic chemistry concepts.
- Demonstrate the ability to communicate basic organic chemistry information clearly and precisely, both orally and in writing on examinations and in laboratory reports.
- Have an understanding of the principles and applications of modern instrumentation, computation, experimental design, and data analysis for basic organic chemistry laboratory; be proficient in basic organic chemistry laboratory skills.

POLICIES

All CES students must familiarize themselves with, and adhere to, all official university-wide student policies. CES takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Lab Session

Students will work in groups and submit a group lab report. Each member of the group will participate in all aspects of the laboratory. All data will be recorded in the notebook (**individual**) and carbon copies should be stapled together and submitted to the instructor at the completion of the laboratory experiment.

Lab Report

- The report for each experiment is worth 100 points each and is due 1 week after completion of the experiment.
- Late lab reports will be assessed a 5 points per calendar day penalty. You must staple reports before submitting.
- Double space all reports and questions. Use a 11 point Times New Roman font.

Final Exam

The final exam is cumulative and covers all experiments performed in the semester. The final exam date is scheduled for your last regular lab session.

Course Requirements and Grading Policy:

The evaluation of this course will be from the performance on pre laboratory (**individual**), laboratory reports (group) (70%), and a final laboratory examination (**individual**) (30%) at the end of the lab course. This does not involve performing an actual experiment but will consist of problems related to the work performed during the course of the lab.

Final letter grade awarded to each student will be based upon his/her performance in the exams and the points earned in the lab report component of the course. Your course grade will be weighted as shown below:

- Prelab/lab report - 70%
- Final lab exam - 30%

Students achieving at least the following average percentages will receive at least the indicated grade:

Grade Scale

A	90.0% - 100.0%	C	65.0% - 72.9%
B+	85.0% - 89.9%	D	60.0% - 64.9%
B	75.0% - 84.9%	F	0.0% - 59.9%
C+	73.0% - 74.9%		

Attendance Policy:

Attendance at classes will be recorded and is **mandatory**. Each class is a learning experience that cannot be replicated through simply “getting the notes.” Attendance to all laboratory sessions is mandatory. A missed laboratory session without an excused absence will result in a grade of zero (0) for that experiment. A second unexcused absence will result in a grade of zero (0) for the course. An excused absence must be obtained from the instructor before the relevant lab. An excused absence will only be granted for verifiable documented reasons of serious illness or family emergency. Lateness to lab will NOT be tolerated (changes in directions/safety concerns may be given during the pre-laboratory lecture). The instructor reserves the right to dismiss you from the lab and you get a ZERO for the week. College policy states that students must notify faculty within the first three weeks of the semester if they anticipate missing any classes due to religious observance.

Homework Policy: Homework is an expectation of the course. The homework problems set by the instructor are to be handed in for grading and will be used in the determination of the final letter grade as described above.

Laboratory Reports and Notebooks

Laboratory reports are an important part of science education. Students in chemistry and biology will be expected to write professional laboratory report. Therefore, in this course you will be introduced to several of the major components of writing a laboratory report. It is my hope that this course will give you an advantage in upper level courses.

The format

Clarity of expression, correct grammar, spelling and paragraphing are expected. The lab report will consist of the following and must be in the order below: All components will be in paragraph form and must be double typed double spaced in New Times Roman 11-point font with 1” margins. Do not list anything. Data and results must be put in tables.

Tables

You must use tables. They must be numbered using Roman Numerals: (I, II, III----etc)

FIGURES & Graphs – Should be number using alpha numerals (1, 2, 3-----etc)

Abstract (150 -300 words)

The abstract is a very terse accounting of what you did. There should be one sentence stating the following:

- What the objective of the experiment was. Note: do not state that the objective was “to learn...” Your objective is
- to measure, synthesize, determine...etc.
- Indicate the method you used to achieve your objective.
- Did you use any (not ordinary lab equipment) special equipment like spectrometers? If so, state the make and model number.
- State your results. Do not include any raw data or procedural steps.
- Draw a conclusion; ie, “ the product’s melting point indicates that it is ----- because the accepted melting point of ----- is 123°C¹”

Introduction (500 -2000 words)

The introduction must contain a discussion of the basic principles the lab is illustrating. This must be in your own words and not a paraphrase of the published experiment in your lab manual. You must cite statements of fact not ordinarily known using the following method: [#] at the end of the sentence containing the information. Do not include extraneous facts that do not pertain directly to the objective of the lab. Any equations used should be included along with a discussion of how they will be used. Be sure to identify all variables in every equation you discuss.

Experimental

Writing a procedure for a chemical experiment involves using a formal and stylized writing approach. The experimental section will consist of a short paragraph that includes a sentence that refers the reader to some source for the procedure. For example, the student may write: “The procedure for this experiment has been described in the laboratory handout.¹” The number refers to the citation number. This number is used to refer the reader to the citation in the References section where the full reference (including information such as the name of the author, title of book or web site, date of publication, and page number or exact web address) will appear next to number 1. In addition to the reference citation, details from the published procedure and any experimental hints or tips that may aid the reader in understanding and repeating the experiment should be included. All reagents used must be reported in as the **quantity you actually used** (in parentheses, followed by the number of moles). All products used must be reported in as the **quantity you actually used** (in parentheses, followed by the number of moles) and % yield.

Results

The results section should contain tables, graphs and illustrations.

- Table should be numbered using ROMAN NUMERALS. (Table I, Table II, Table III...)
- Graphs and illustrations should be numbered using ALPHANUMERICS (Figure 1, Figure 2, Figure 3...)
- Label the x and y axes of your graphs with an informative label and include the units. For instance for a titration the x axis would be "Volume NaOH (mL)" while the y axis might be "Voltage (mv)".
- Do not just connect the dots. At this level most graph can be fit to the best straight line ($y = mx + b$) using linear regression. In MS Excel you can use TRENDLINE.
- All tables, graphs and illustrations should have an informative title:

Table I – Experimental Melting Points

- All raw data that is used to perform calculations must be put in a table.

Calculations

- Show all equations you used to calculate your result. For instance, if you are calculating percent error you must first include the equation for percent error as follows:

$$\% \text{ error} = \frac{|ExpVal - AccptVal|}{AccptVal} \times 100$$

- This can be typed (good time to learn how to use the equation writer in MS Word) or neatly handwritten in ink.
- Follow with the actual calculation (can be neatly hand written in ink) using correct significant figures and units.
- If your lab requires repetitive calculations, you only need to include one of these calculations in your report.
- **Percent yield calculations:** Refer to General Chemistry 1 notes on Limiting reactant, theoretical yield and percent yield calculations. Show all steps for full credit

Discussion (400 and 1200 words)

This is an important part of your laboratory report. In this section you will do the following:

- Restate your final results: "The molecular mass of copper sulfate was found to be -----"
- If possible compare your results to expected or literature values.
- Explain the meaning of your results:
- Did you achieve your goal? Why or why not.
- Did your results match literature values? Report literature value and % error.
- If your value was too high, explain why. Be specific.
- If your value was too low, explain why. Be specific.
- Discuss how this laboratory relates to chemistry. Explain what principles and concepts it illustrates.

Conclusion

Provide a global conclusion regarding your experimental results. This section should be 100 – 250 words.

Questions

Type the question itself in bold then answer all questions using complete sentences using regular font. If the question requires a calculation use the rules found under the CALCULATION SECTION above.

References

Include reference over and above the laboratory manual. (five references minimum)

Include cited references in order of how they appear in your report. All references included in this section must have been cited in your report. Citation formats are:

Journal Article:

Author(s): Last name. 1st initial, *Paper Title*, Year, Vol # etc, pages.

Webpage, No author:

Title, Date accessed by you, URL of page.

Book:

Author; Last name. 1st initial, Book Title, Year, Publisher, Editor (if appropriate), city of publisher, page.

You should have a minimum of 5 references.

The Laboratory Notebook (Individual)

This is a research journal. In it you will record exactly what you did. Below is the format you will use

- Fill in all sections on the top of the page on every page you use
- Before you come to class:

- List all chemicals you will be using in the lab in your notebook. Include the
 - chemical name,
 - the chemical formula
 - the CAS number.
- Copy the reaction scheme, make a table showing the physical properties, outline the experimental procedure, objectives and safety in your laboratory notebook.
- **I will initial this entry and your Lab Manual at the beginning of each class. Failure to complete the list and provide your lab manual will result in a maximum of 10-point penalty.**
- **In the laboratory:** The laboratory notebook is a journal that records your activities in the lab in detail. It is written in “stream of consciousness”; that is...as it is happening. You should record
 - Everything you do in enough detail that a stranger could reproduce your work using only your lab notebook as a guide.
 - All observations as you see them.
 - All values including like masses, lengths, pressures, volumes...etc using correct significant figures and units.
 - All calculations. Any calculations should be done in your notebook. If they are done outside of class, you should submit the carbon copies of the work in the next lab session.
 - Before leaving class you must
 - Sign and date the bottom of every completed page
 - Have me sign your last notebook page completed in the lab session.
 - Submit the carbon copies of your notebook pages for that lab session.

Corrections to the notebook

Mistakes will occur when recording data as you collect it. The proper way of correcting mistakes in a laboratory note is to cross out the mistake with a single or double line as seen below and initial the correct entry. Do not scribble out mistake. The mistake must be clearly readable under the line. (This is a legal requirement because laboratory notebooks are legal documents admissible as evidence in court)

Example:

3.020  your initials
 Mass of empty beaker = ~~2.943~~ g

Unused space on notebook page

When you are done with a page, you must draw a diagonal line through any blank unused places on the page before you sign, date and submit the carbon copy. This is also a legal requirement. It prevents anyone from adding additional information to the page after the fact.

Chemistry Teaching Lab Safety Policy

(<https://chemistry.njit.edu/chemistry-laboratory-safety-information>)

- All lab students (Undergraduate Labs) have to wear gloves, goggles and lab coats.
- All lab students have to buy/bring their OWN gloves, goggles and lab coats.
- Only first week of check in lab students can attend the labs without Personal protective equipment (PPE) i.e., gloves, goggles and lab coats

Makeup Exam Policy: There will normally be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event that a student has a legitimate reason for missing a quiz or exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor’s note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the CES Department Office/Instructor that the exam will be missed so that appropriate steps can be taken to make up the grade.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times. Such devices must be stowed in bags during exams or quizzes.

ADDITIONAL RESOURCES

Chemistry Tutoring Center: Located in the Central King Building, Lower Level, Rm. G12. Hours of operation are Monday - Friday 10:00 am - 6:00 pm. For further information please click [here](#).

Accommodation of Disabilities: Office of Accessibility Resources and Services (**formerly known as Disability Support Services**) offers long term and temporary accommodations for undergraduate,

graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director at the Office of Accessibility Resources and Services at [973-596-5417](tel:973-596-5417) or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Office of Accessibility Resources Services office authorizing your accommodations will be required.

For further information regarding self-identification, the submission of medical documentation and additional support services provided please visit the Accessibility Resources and Services (OARS) website at:

- <http://www5.njit.edu/studentsuccess/disability-support-services/>

Important Dates (See: [Spring 2019 Academic Calendar, Registrar](#))

Date	Day	Event
January 22, 2019	T	First Day of Classes
February 1, 2019	F	Last Day to Add/Drop Classes
March 17, 2019	S	Spring Recess Begins – No Classes
March 24, 2019	S	Spring Recess Ends
April 8, 2019	M	Last Day to Withdraw
April 19, 2019	F	Good Friday – No Classes
May 7, 2019	T	Last Day of Classes
May 8 - 9, 2019	W - R	Reading Days
May 10 - 16, 2019	F - R	Final Exam Period

Laboratory Schedule

Week	Experiment	Expt. Number
1	Check in/Safety Lecture	
2 - 4	Caffeine: Natural Product Extraction, Distillation Evaporation, Sublimation, TLC.	1
5 - 6	Pinacolone Reduction: Reaction, Extraction, Distillation, IR	2
7 - 8	Pinacoyl Alcohol Dehydration: Reaction, Distillation, GC.	3
9 - 10	Esterification: Reaction, Extraction, Distillation, IR	4
11	Aldol: Reaction, UV.(Crossed Aldol Condensation	5
12	Aspirin Synthesis: Reaction, Extraction, Recrystallization	6
13	Exam /Check out	-