



CREDIT COURSE OUTLINE

I. COVER PAGE

(1) CHEM 29A	(2) ORGANIC CHEMISTRY LABORATORY I	(3) 2
Number	Title	Units

<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3">(4) Lecture / Lab Hours:</td> </tr> <tr> <td colspan="3">Total Course Hours</td> </tr> <tr> <td style="width: 30%;">Total Lec hours:</td> <td style="width: 10%;"></td> <td style="width: 60%; text-align: center;">0</td> </tr> <tr> <td>Total Lab hours:</td> <td></td> <td style="text-align: center;">6.00</td> </tr> <tr> <td>Total Contact hours:</td> <td></td> <td style="text-align: center;">108.00</td> </tr> <tr> <td colspan="3">Lec will generate <u>0</u> hour(s) outside work.</td> </tr> <tr> <td colspan="3">Lab will generate <u>0</u> hour(s) outside work.</td> </tr> <tr> <td colspan="3">(5) Grading Basis:</td> </tr> <tr> <td style="border: none;">Grading Scale Only</td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;">Pass/No Pass option</td> <td style="border: none;"></td> <td style="border: none; text-align: center;">X</td> </tr> <tr> <td style="border: none;">Pass/No Pass only</td> <td style="border: none;"></td> <td style="border: none;"></td> </tr> <tr> <td colspan="3">(6) Advisories:</td> </tr> <tr> <td colspan="3"><i>No defined advisories.</i></td> </tr> <tr> <td colspan="3">(7) Pre-requisites (requires C grade or better):</td> </tr> <tr> <td colspan="3">Corequisites: CHEM 28A</td> </tr> </table>	(4) Lecture / Lab Hours:			Total Course Hours			Total Lec hours:		0	Total Lab hours:		6.00	Total Contact hours:		108.00	Lec will generate <u>0</u> hour(s) outside work.			Lab will generate <u>0</u> hour(s) outside work.			(5) Grading Basis:			Grading Scale Only			Pass/No Pass option		X	Pass/No Pass only			(6) Advisories:			<i>No defined advisories.</i>			(7) Pre-requisites (requires C grade or better):			Corequisites: CHEM 28A			<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3">(8) Classification:</td> </tr> <tr> <td style="width: 30%;"></td> <td style="width: 30%;"></td> <td style="width: 40%;"></td> </tr> <tr> <td></td> <td>Degree applicable:</td> <td style="text-align: center;">X</td> </tr> <tr> <td></td> <td>Non-degree applicable:</td> <td></td> </tr> <tr> <td></td> <td>Basic skills:</td> <td></td> </tr> <tr> <td>(9) RC</td> <td>Fulfills AS/AA degree requirement: (area)</td> <td></td> </tr> <tr> <td></td> <td>General education category:</td> <td></td> </tr> <tr> <td></td> <td>Major:</td> <td></td> </tr> <tr> <td></td> <td>Certificate of:</td> <td></td> </tr> <tr> <td></td> <td>Certificate in:</td> <td></td> </tr> <tr> <td>(10) CSU</td> <td>Baccalaureate:</td> <td style="text-align: center;">X</td> </tr> <tr> <td>(11) Repeatable: (A course may be repeated three times)</td> <td></td> <td style="text-align: center;">0</td> </tr> </table>	(8) Classification:							Degree applicable:	X		Non-degree applicable:			Basic skills:		(9) RC	Fulfills AS/AA degree requirement: (area)			General education category:			Major:			Certificate of:			Certificate in:		(10) CSU	Baccalaureate:	X	(11) Repeatable: (A course may be repeated three times)		0
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(12) Catalog Description:

This course provides a study of the properties and reactions of organic compounds such as alkenes, alkyl halides, alcohols and acids. Students will perform qualitative experiments with acetylene, alkenes and various alcohols and work hands on with a melting point apparatus and refractometer. In addition, an introduction will be given on how to use a gas chromatograph and an infrared spectrophotometer (FTIR). Analyses of IR, NMR and MS spectra will be covered.

II. COURSE OUTCOMES:

(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)

Upon completion of this course, students will be able to:

- I. read and follow instructions in an organic laboratory manual, safely handling organic chemicals and grounded glassware.
- II. determine physical properties of organic compounds such as melting point and refractive index.
- III. synthesize simple organic compounds such as but not limited to cyclohexene, t-butylchloride, alcohols and acids.
- IV. analyze organic molecules using a gas chromatograph and infrared spectrometer and interpret the spectra.

III. COURSE OBJECTIVES:

(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)

In the process of completing this course, students will:

- I. learn how to interpret instructions to set up and perform an organic experiment.
- II. learn general safety protocols for the organic chemistry laboratory.
- III. learn how to analyze the physical properties of organic compounds synthesized e.g. the melting points and the refractive indexes.
- IV. gain an understanding of and apply concepts of organic synthesis and purification.
- V. learn how to work with a gas chromatograph and how to interpret the chromatograms that are produced from the injected samples.
- VI. learn how to obtain an infrared spectrum from a sample and how to analyze it.
- VII. learn how to interpret nuclear magnetic resonance (NMR) and mass spectroscopy (MS) spectra.

IV. COURSE OUTLINE:

Lab Content:

Each of the following experiments will take 4-6 hours. Alternative experiments may be substituted.

- A. Simple distillation
- B. Fractional distillation
- C. Determination of melting points and refractive indexes.
- D. Purification by recrystallization and sublimation
- E. Synthesis of cyclohexene
- F. Reactions of alkenes and alkynes using cyclohexene and acetylene
- G. cis -1,2-Cyclohexanediol
- H. Myristin from Nutmeg
- I. N - Butyl bromide
- J. Synthesis of t-butylchloride
- K. Solvolysis of t-butyl chloride. Kinetics experiment.
- L. Reactions of Alcohols
- M. Grignard reaction: 2-Methyl-2-hexanol
- N. GC and IR experiments
- O. Analysis of MS and NMR spectra
- P. Stereochemistry using the Molecular Model box and a variety of computer programs

V. APPROPRIATE READINGS

Reading assignments may include but are not limited to the following:

I. Sample Text Title:

1. Recommended - Pavia, D. L. *Intro to Organic Lab Techniques Microscale Approach*, ed. 1st Brooks Cole, 2007, ISBN: 9780495016304
2. Recommended - Svoronos, P., Sarlo, E., Kulawiec, R.J *Organic Chemistry Laboratory Manual*, ed. 2nd McGraw-Hill, 1997, ISBN: 9780697339232

II. Other Readings

1. Recommended - McMurray, J. *Organic Chemistry with Biological Applications, 2nd ed. Belmont, CA: Cengage, 2010, ISBN: 9780495391449.*
2. Recommended - *Spectral Interpretation and Specdemo*

Global or international materials or concepts are appropriately included in this course

Multicultural materials and concepts are appropriately included in this course

If either line is checked, write a paragraph indicating specifically how global/international and/or multicultural materials and concepts relate to content outline and/or readings.

VI. METHODS TO MEASURE STUDENT ACHIEVEMENT AND DETERMINE GRADES:

Students in this course will be graded in at least one of the following four categories. Please check those appropriate. A degree applicable course must have a minimum of one response in category A, B, or C.

A. Writing	
Check either 1 or 2 below	
X	1. Substantial writing assignments are required. Check the appropriate boxes below and provide a written description in the space provided.
	2. Substantial writing assignments are NOT required. If this box is checked leave this section blank. For degree applicable courses you must complete category B and/or C.
	a) essay exam(s)
	b) term or other paper(s)
X	c) laboratory report(s)
	d) written homework
	e) reading reports
	f) other (specify)

Required assignments may include but are not limited to the following:

Laboratory reports are turned in after each experiment. They include the purpose of the experiment, the reaction and reaction mechanism, the yield of the compound prepared, the purity, melting point and refractive index, a conclusion, and answers to assigned post-lab questions.

B. Problem Solving

Computational or non-computational problem-solving demonstrations, including:

	a) exam(s)	X	d) laboratory reports
	b) quizzes		e) field work
X	c) homework problems		f) other (specify):

Required assignments may include but are not limited to the following:

1. Each experiment is finalized with a lab report in which purpose, reactions and reaction mechanism, data and a conclusion are stated.
2. Three in-depth lab reports are completed and written as a research paper using internet resources, and organic chemistry text books.

C. Skill demonstrations, including:

X	a) class performance(s)		c) performance exams(s)
	b) field work		d) other (specify)

Required assignments may include but are not limited to the following:

The student's performance in terms of safety, accuracy and efficiency are noted during the laboratory experiments and included in the grade for the laboratory reports.

D. Objective examinations including:

	a) multiple choice		d) completion
	b) true/false		e) other (specify):
	c) matching items		

COURSE GRADE DETERMINATION:

Description/Explanation: Based on the categories checked in A-D, it is the recommendation of the department that the instructor's grading methods fall within the following departmental guidelines; however, the final method of grading is still at the discretion of the individual instructor. The instructor's syllabus must reflect the criteria by which the student's grade has been determined. (A minimum of five (5) grades must be recorded on the final roster.)

If several methods to measure student achievement are used, indicate here the approximate weight or percentage each has in determining student final grades.

Individual lab. reports 40% and Extensive lab. research papers 60%

Does Course Require Social Facilities? Yes: Organic chemistry laboratory

Attached Files:

BASIC SKILLS ADVISORIES PAGE The skills listed are those needed for eligibility for English 125, 126, and Math 101. These skills are listed as the outcomes from English 252, 262, and Math 250. In the right hand column, list at least three major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.

Check the appropriate spaces.

- Eligibility for Math 101 is advisory for the target course.
 Eligibility for English 126 is advisory for the target course.
 Eligibility for English 125 is advisory for the target course.

If the reviewers determine that an advisory or advisories in Basic Skills are all that are necessary for success in the target course, stop here, provide the required signatures, and forward this form to the department chair, the appropriate associate dean, and the curriculum committee.

CONTENT REVIEW**CHEM 28A ORGANIC CHEMISTRY I****REQUISITES****Corequisite -- CHEM 28A ORGANIC CHEMISTRY I**

- analyze the structural formula of an organic compound, recognize its functional groups and name it properly.
- draw a structural formula given the systematic name of an organic compound.
- recognize stereochemistry and understand the physical properties of chiral compounds.
- complete the reactions of many aliphatic molecules and write the correct reaction mechanism.
- analyze MS, IR and NMR spectra and determine the structure of an unknown compound.

- gain an understanding of and apply concepts of organic synthesis and purification.
- learn how to work with a gas chromatograph and how to interpret the chromatograms that are produced from the injected samples.
- learn how to obtain an infrared spectrum from a sample and how to analyze it.
- learn how to interpret nuclear magnetic resonance (NMR) and mass spectroscopy (MS) spectra.

ESTABLISHING PREREQUISITES OR COREQUISITES

Every prerequisite or corequisite requires content review plus justification of at least one of the seven kinds below. Prerequisite courses in communication and math outside of their disciplines require justification through statistical evidence. Kinds of justification that may establish a prerequisite are listed below.

Check one of the following that apply. Documentation may be attached.

1. The prerequisite/corequisite is required by law or government regulations.
Explain or cite regulation numbers:
2. The health or safety of the students in this course requires the prerequisite.
Justification: Indicate how this is so.
3. The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.
Justification: Indicate how this is so.
4. The prerequisite is required in order for the course to be accepted for transfer to the UC or CSU systems.
Justification: Indicate how this is so.
5. Significant statistical evidence indicates that the absence of the prerequisite course is related to unsatisfactory performance in the target course.
Justification: Cite the statistical evidence from the research.
6. The prerequisite course is part of a sequence of courses within or across a discipline.
7. Three CSU/UC campuses require an equivalent prerequisite or corequisite for a course equivalent to the target course:
CSU Fresno CHEM129A CHEM128A Cal Poly SLO CHEM318 CHEM317 UC Berkeley CHEM 112B CHEM112A