



CREDIT COURSE OUTLINE

I. COVER PAGE

| | | |
|--------------|-------------------------|-------|
| (1) CHEM 28A | (2) ORGANIC CHEMISTRY I | (3) 3 |
| 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;">3.00</td> </tr> <tr> <td>Total Lab hours:</td> <td></td> <td style="text-align: center;">0</td> </tr> <tr> <td>Total Contact hours:</td> <td></td> <td style="text-align: center;">54.00</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>Grading Scale Only</td> <td></td> <td></td> </tr> <tr> <td>Pass/No Pass option</td> <td style="text-align: center;">X</td> <td></td> </tr> <tr> <td>Pass/No Pass only</td> <td></td> <td></td> </tr> <tr> <td colspan="3">(6) Advisories:</td> </tr> <tr> <td colspan="3">Eligibility for English 125 and</td> </tr> <tr> <td colspan="3">Eligibility for English 126</td> </tr> <tr> <td colspan="3">(7) Pre-requisites (requires C grade or better):</td> </tr> <tr> <td colspan="3">CHEM 1B</td> </tr> <tr> <td colspan="3">Corequisites:</td> </tr> </table> | (4) Lecture / Lab Hours: | | | Total Course Hours | | | Total Lec hours: | | 3.00 | Total Lab hours: | | 0 | Total Contact hours: | | 54.00 | 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: | | | Eligibility for English 125 and | | | Eligibility for English 126 | | | (7) Pre-requisites (requires C grade or better): | | | CHEM 1B | | | Corequisites: | | | <table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3">(8) Classification:</td> </tr> <tr> <td style="width: 30%;"></td> <td style="width: 10%;"></td> <td style="width: 60%;"></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 |
| (4) Lecture / Lab Hours: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Course Hours | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Lec hours: | | 3.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Lab hours: | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Contact hours: | | 54.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eligibility for English 125 and | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eligibility for English 126 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (7) Pre-requisites (requires C grade or better): | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CHEM 1B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Corequisites: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (8) Classification: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

(12) Catalog Description:

Structures, properties, reactions, and nomenclature of alkanes, alkenes, alkynes, alkyl halides, alcohols, amines, ethers, epoxides, and organometallic compounds are covered. The course includes radical, substitution, and elimination reactions as well as synthesis, separation, and identification of representative compounds. The reactions and nomenclature of stereoisomers are covered as well as resonance and conjugation. Infrared, nuclear magnetic, and mass spectroscopies are introduced. Kinetic versus thermodynamic control of reactions and multistep syntheses are taught.

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

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 analyze the structural formula of an organic compound, recognize its functional groups and learn how to name it properly using the IUPAC nomenclature.
- II. gain an understanding how to draw structural formulas and line-bond formulas given the systematic name of an organic compound.
- III. gain an understanding of stereochemistry, recognizing asymmetric carbon atoms that cause chirality.
- IV. learn how to complete the reactions of many aliphatic molecules and practice writing correct reaction mechanisms.
- V. learn how to analyze MS, IR and NMR spectra and determine the structure of an unknown compound.

IV. COURSE OUTLINE:

Lecture Content:

- A. Structure and properties of the carbon atom
- B. Methane (energy of activation, transition states)
- C. Alkanes (free radical substitution)
- D. Stereochemistry I (stereoisomers)
- E. Alkenes I: structure and preparation (elimination reactions)
- F. Alkenes II: reactions (addition reactions)
- G. Nucleophilic substitution reactions, first order and second order.
- H. Stereochemistry II: preparation and reactions of stereoisomers
- I. Elimination Reactions, E1 and E2. Rearrangement of carbo-cations.
- J. Alkynes and dienes
- K. Mass spectrometry, infrared spectroscopy, and nuclear magnetic resonance
- L. Alcohols I: preparation and physical properties
- M. Alcohols II: reactions
- N. Ethers and epoxides

V. APPROPRIATE READINGS

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

I. Sample Text Title:

1. Recommended - McMurray, J *Organic Chemistry with Biological Applications*, ed. 2nd Brooks Cole, 2010,

II. Other Readings

1. Recommended - *Computer programs: 1. B. Luceigh, Organic Chem TV I 2. G. Lampman Organic Nomenclature*
2. Recommended - J. Traynham. *Organic Nomenclature, 6th ed. Prentice Hall, 2007*

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. | | |
| X | a) essay exam(s) | X | d) written homework |
| | b) term or other paper(s) | | e) reading reports |
| | c) laboratory report(s) | | f) other (specify) |

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

Textbook questions, worksheets and writing the overall reaction and reaction mechanism using Lewis structures and curved arrow notation. Students should be able to write a statement on the stereochemistry of the product.

| | | | |
|---|----------------------|--|-----------------------|
| B. Problem Solving | | | |
| Computational or non-computational problem-solving demonstrations, including: | | | |
| X | a) exam(s) | | d) laboratory reports |
| X | b) quizzes | | e) field work |
| X | c) homework problems | | f) other (specify): |

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

Calculating enantiomeric excesses and the percentages of each enantiomer in a sample. Additionally students should be able to draw structural formulas with the correct stereochemistry.

| | | | |
|--|-------------------------|--------------------------|-------------------------|
| C. Skill demonstrations, including: | | | |
| <input type="checkbox"/> | a) class performance(s) | <input type="checkbox"/> | c) performance exams(s) |
| <input type="checkbox"/> | b) field work | <input type="checkbox"/> | d) other (specify) |

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

| | | | |
|---|--------------------|--------------------------|---------------------|
| D. Objective examinations including: | | | |
| <input type="checkbox"/> | a) multiple choice | <input type="checkbox"/> | d) completion |
| <input type="checkbox"/> | b) true/false | X | e) other (specify): |
| <input type="checkbox"/> | 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.

Homework Assignments and Worksheets 16.67% Quizzes 33.33% Exams 50.00%

Does Course Require Social Facilities? No

Attached Files:

| | |
|---|---|
| <p><u>BASIC SKILLS ADVISORIES PAGE</u> 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 <u>three</u> major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.</p> | |
| <p>(eligibility for English 126) (as outcomes for English 262)</p> <p><input checked="" type="checkbox"/> Using phonetic, structural, contextual, and dictionary skills to attack and understand words.</p> <p><input checked="" type="checkbox"/> Applying word analysis skills to reading in context.</p> <p><input checked="" type="checkbox"/> Using adequate basic functional vocabulary skills.</p> <p><input checked="" type="checkbox"/> Using textbook study skills and outlining skills.</p> <p><input checked="" type="checkbox"/> Using a full range of literal comprehension skills and basic analytical skills such as predicting, inferring, concluding, and evaluating.</p> | <p>Students are required to read a college level textbook.</p> <p>Students are required to use outlining skills and specific textbook study skills.</p> <p>Good comprehension of organic reactions requires basic analytical reading skills such as inferring, conclusion, etc.</p> |
| <p>(eligibility for English 125) (as outcomes for English 252)</p> <p><input checked="" type="checkbox"/> Writing complete English sentences and avoiding errors most of the time.</p> <p><input checked="" type="checkbox"/> Using the conventions of English writing: capitalization, punctuation, spelling, etc.</p> <p><input checked="" type="checkbox"/> Using verbs correctly in present, past, future, and present perfect tenses, and using the correct forms of common irregular verbs.</p> <p><input checked="" type="checkbox"/> Expanding and developing basic sentence structure with appropriate modification.</p> <p><input checked="" type="checkbox"/> Combining sentences using coordination, subordination,</p> | <p>Written answers are part of the homework questions.</p> <p>On the exams explanations for chemical phenomena need to be written using complete English sentences.</p> <p>Reaction mechanisms need to be explained in a concise manner using correct capitalization, spelling and punctuation.</p> |

and phrases.
 Expressing the writer's ideas in short personal papers utilizing the writing process in their development.

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 1B GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS

REQUISITES

Subject Prerequisite -- CHEM 1B GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS

1. learn chemical kinetic mathematical operations to determine order and rates of a reaction and understand the effects of temperature; 2. learn to apply Le Chatelier's Principle to systems displaced from equilibrium, mathematically solve for the equilibrium constant and understand limitations involving the equilibrium constant; 3. demonstrate the ability to classify acids and bases then determine equilibrium constant and pH of acids, bases, and buffers; 4. recognize physical and chemical properties of element groups (e.g. alkali metals; alkaline earth metals, transition elements, group 13 metals, group 14 metals, nonmetals including halogens, and noble gases);

- learn how to analyze the structural formula of an organic compound, recognize its functional groups and learn how to name it properly using the IUPAC nomenclature.
- learn how to complete the reactions of many aliphatic molecules and practice writing correct reaction mechanisms.
- learn how to analyze MS, IR and NMR spectra and determine the structure of an unknown compound.

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 CHEM 128A CHEM 1B Cal Poly SLO CHEM 316 CHEM 129 UC Berkeley CHEM 112A CHEM 1B