I. CATALOG INFORMATION
   A. Discipline: CHEMISTRY
   B. Subject Code and Number: CHEM M11
   C. Course Title: Foundations of General, Organic, and Biochemistry
   D. Credit Course units:
      Units: 5
      Lecture Hours per week: 4
      Lab Hours per week: 3
      Variable Units: No
   E. Student Learning Hours:
      Lecture Hours:
      Classroom hours: 70 - 70
      Laboratory/Activity Hours:
      Laboratory/Activity Hours 52.5 - 52.5
      Total Combined Hours in a 17.5 week term: 122.5 - 122.5
   F. Non-Credit Course hours per week
   G. May be taken a total of: X 1 2 3 4 time(s) for credit
   H. Is the course co-designated (same as) another course: No X Yes
      If YES, designate course Subject Code & Number: 
   I. Course Description:
      Covers general, organic, and biological chemistry with an emphasis placed on medical applications. Explores topics in general chemistry such as the modern view of the atom, molecules, chemical compounds, reactions, and calculations. Includes topics in organic and biochemistry such as hydrocarbons, alcohols, aldehydes and ketones, amines, carboxylic acids and their derivatives, carbohydrates, lipids, proteins, and nucleic acids.
   J. Entrance Skills
      *Prerequisite: No X Yes Course(s)
      MATH M01 or one year of high school algebra or equivalent with a C grade or higher.
      *Corequisite: No X Yes Course(s)
      Limitation on Enrollment: No X Yes
      Recommended Preparation: No X Yes Course(s)
### Other Catalog Information:

This course is designed for students who are Allied Health Science majors and for students not planning to take Chemistry M01A.

### II. COURSE OBJECTIVES

Upon successful completion of the course, a student will be able to:

<table>
<thead>
<tr>
<th></th>
<th>Methods of evaluation will be consistent with, but not limited by, the following types or examples.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling. quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), final examinations.</td>
</tr>
<tr>
<td>2</td>
<td>list the basic units of measurement in the metric and English systems, perform unit conversions within and between systems, and express results appropriately with significant figures and in scientific notation. quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), final examinations.</td>
</tr>
<tr>
<td>3</td>
<td>classify the states of matter, distinguish between chemical and physical changes, identify the basic components of the nuclear atom, identify the symbols of common elements, predict atomic trends, name simple inorganic compounds. quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), final examinations.</td>
</tr>
<tr>
<td>4</td>
<td>draw valid Lewis structures of common molecules, identify bond polarities using electronegativity values, predict the molecular geometry of molecules using VSPER (Valence Shell Pair Electron Repulsion). quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), final examinations.</td>
</tr>
<tr>
<td>5</td>
<td>identify the Lewis structures of common functional groups, name simple organic compounds using IUPAC (International Union of Pure and Applied Chemistry) nomenclature rules, identify chiral molecules, label stereochemical relationships, and draw chair forms of cyclohexane rings. quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), final examinations.</td>
</tr>
<tr>
<td></td>
<td>classify and predict double displacement and acid-base reactions of inorganic compounds, perform stoichiometric calculations for reactions, calculate changes in ideal gases using the ideal gas law, rank the strength of intermolecular forces.</td>
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<td>---</td>
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</tr>
<tr>
<td>7</td>
<td>identify common acids and bases, predict the Keq of acid-base reactions, calculate the pH of solutions, predict the pH of important physiological fluids.</td>
</tr>
<tr>
<td>8</td>
<td>predict the outcome of reactions of alkenes, alkyl halides, carbonyl compounds.</td>
</tr>
<tr>
<td>9</td>
<td>identify classes of carbohydrates, identify glycosidic bonds, predict the outcome of saponification reactions, classify properties of amino acids, identify the effects of structural organization on proteins.</td>
</tr>
<tr>
<td>10</td>
<td>identify the names of nucleic acids, predict the identity of base pairs, differentiate the structures of nucleotides and nucleosides, identify the sequence of DNA replication, identify the function of codons.</td>
</tr>
<tr>
<td>11</td>
<td>experiment with acids and bases, alkanes, alkenes, alcohols, aldehydes, ketones, amines, carboxylic acids and their derivatives, proteins, DNA, and enzymes.</td>
</tr>
<tr>
<td>12</td>
<td>conduct various quantitative and qualitative experiments with adherence to safety protocols, record observations and express numerical values appropriately, analyze acquired data, and formulate proper conclusions through written expression of results.</td>
</tr>
</tbody>
</table>
apply laboratory techniques such as chromatography, spectrophotometric analysis, filtration, differential solubilities to separate and analyze mixtures, organic synthesis and product characterization, and molecular modeling.

### III. COURSE CONTENT

<table>
<thead>
<tr>
<th>Estimated %</th>
<th>Topic</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00%</td>
<td>Measurements in Chemistry - Measurement Systems, Uncertainty and Significant Figures, Scientific Notation, Conversion Factors and Dimensional Analysis</td>
<td>1, 2, 12</td>
</tr>
<tr>
<td>6.00%</td>
<td>Matter and Energy - The Different States and Properties of Matter, Mixtures and Substances, Temperature Conversions, Specific Heat</td>
<td>3</td>
</tr>
<tr>
<td>6.00%</td>
<td>Atomic Structure - Protons, Neutrons, and Electrons, Isotopes and Atomic Mass, Periodic Trends</td>
<td>3</td>
</tr>
<tr>
<td>6.00%</td>
<td>Molecular Structure - Ionic and Covalent Compounds (Naming and Drawing), Shapes and Polarity of Molecules/Ions</td>
<td>4</td>
</tr>
<tr>
<td>6.00%</td>
<td>Chemical Equations and Calculations - Types of Reactions, Mole Relationships and Mass Calculations, Energy Changes in Chemical Reactions</td>
<td>2, 6</td>
</tr>
<tr>
<td>6.00%</td>
<td>Properties of Gases, Liquids, Solids, and Solutions - Gas Pressure, Unusual Nature of Water, Electrolytes and Nonelectrolytes, Solubility and Solution Concentration</td>
<td>6</td>
</tr>
<tr>
<td>6.00%</td>
<td>Characteristics of Nucleic Acids, Primary Structure of Nucleic Acids, DNA Double Helix, Replication of DNA, RNA, Protein Synthesis</td>
<td>8, 10, 11</td>
</tr>
<tr>
<td>6.00%</td>
<td>Saturated Hydrocarbons - Alkanes and Cycloalkanes, Basic Nomenclature, Structural Formulas and Isomerism</td>
<td>5</td>
</tr>
<tr>
<td>6.00%</td>
<td>Properties and Reactions of Alcohols, Aldehydes, and Ketones; Chiral Molecules</td>
<td>5</td>
</tr>
<tr>
<td>6.00%</td>
<td>Properties of Carboxylic Acids and Esters; Phosphoesters and Thioesters</td>
<td>5, 8</td>
</tr>
<tr>
<td>6.00%</td>
<td>Properties of Amines and Amides, Medically Important Amines and Reactions, Medically Important Amides and Reactions</td>
<td>5, 8</td>
</tr>
<tr>
<td>6.00%</td>
<td>Acids, Bases, and Buffers - Arrhenius and Bronsted-Lowry Definitions, Acid/Base Properties of Water, pH Scale, Buffer Solutions</td>
<td>7</td>
</tr>
<tr>
<td>6.00%</td>
<td>Lipids - Characteristics of Lipids, Structural Characteristics of Fatty Acids, Triacylglycerols, Reactions of Triacylglycerols, Steroids</td>
<td>9</td>
</tr>
<tr>
<td>Percentage</td>
<td>Topic</td>
<td>Code</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>8.00%</td>
<td>Unsaturated Hydrocarbons - Alkenes and Cycloalkenes, Physical and Chemical Properties of Alkenes, Alkynes and Aromatic Hydrocarbons, Isomerism in Alkenes and Cycloalkenes, Organic Mechanisms</td>
<td>5, 8</td>
</tr>
<tr>
<td>8.00%</td>
<td>Carbohydrates - Classification of Monosaccharides, Chemical Properties of Monosaccharides, Disaccharides and Polysaccharides</td>
<td>9</td>
</tr>
<tr>
<td>6.00%</td>
<td>Characteristics of Proteins, Amino Acids, Peptide Formation, Levels of Protein Structure, Enzymes</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td><strong>Lab (must total 100%)</strong></td>
<td></td>
</tr>
<tr>
<td>5.00%</td>
<td>Safety in the chemistry laboratory</td>
<td>12</td>
</tr>
<tr>
<td>10.00%</td>
<td>Laboratory activities relating to measurements, use of chemistry laboratory equipment, significant figures, and conservation of mass</td>
<td>12</td>
</tr>
<tr>
<td>20.00%</td>
<td>Laboratory activities relating to reactions of aqueous ions, including single and double displacement reactions, precipitation reactions, acid/base reactions, and stoichiometry</td>
<td>12</td>
</tr>
<tr>
<td>15.00%</td>
<td>Laboratory activities using molecular modeling that relate to structure and stereochemistry of inorganic, organic, and bio-molecules</td>
<td>13</td>
</tr>
<tr>
<td>15.00%</td>
<td>Laboratory activities analyzing properties of organic compounds</td>
<td>11</td>
</tr>
<tr>
<td>15.00%</td>
<td>Laboratory activities analyzing properties of biochemical compounds</td>
<td>13</td>
</tr>
<tr>
<td>20.00%</td>
<td>Laboratory activities relating to the synthesis and purification of organic and bioorganic compounds</td>
<td>13</td>
</tr>
</tbody>
</table>

### IV. TYPICAL ASSIGNMENTS

#### A. Writing assignments

Writing assignments are required. Possible assignments may include, but are not limited to:

1. Evaluation of assigned readings, such as chemistry of nutrition.
2. Essay and short answer exam questions.
3. Essays on assigned topics, such as metabolic disorders.
4. Review of scientific literature, such as DNA sequencing.

#### B. Appropriate outside assignments

Appropriate outside assignments are required. Possible assignments may include, but are not limited to:

1. Assigned reading material from the textbook and laboratory manual.
2. Organic stereochemistry problem sets.
3. Readings from scientific literature regarding pharmaceutically important compounds.

#### C. Critical thinking assignments

Critical thinking assignments are required. Possible assignments may include, but are not limited to:

1. Class discussion of example problems, homework, and problem solving sessions.
2. Class analysis of laboratory data.
3. Describe and apply the series of steps for obtaining the solution to quantitative chemical problems.
compare and contrast multiple methods of solution to a particular problem.

apply chemical principles to discuss various medical and health-related issues such as high blood pressure, heart disease, and patient care.

V. METHODS OF INSTRUCTION

Methods of instruction may include, but are not limited to:

- Distance Education – When any portion of class contact hours is replaced by distance education delivery mode (Complete DE Addendum, Section XV)
- Lecture/Discussion
- Laboratory/Activity
- Other (Specify)
  Chemical demonstrations performed by instructor, student group work, online tutorials, homework, and study aids

Optional Field Trips

Required Field Trips

VI. METHODS OF EVALUATION

Methods of evaluation may include, but are not limited to:

- Essay Exam
- Problem Solving Exam
- Objective Exams
- Classroom Discussion
- Reports/Papers/Journals
- Projects
- Skill Demonstration
- Participation
- Other (specify)

Miniature reports emphasizing specific areas of a full research report (procedure, background, etc.)

VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS


VIII. STUDENT MATERIALS FEES

- No
- Yes

IX. PARALLEL COURSES

<table>
<thead>
<tr>
<th>College</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
</table>

http://www.curricunet.com/moorpark/reports/course_outline_html.cfm?courses_id=3220
X. MINIMUM QUALIFICATIONS

Courses Requiring a Masters Degree:
Master’s in chemistry OR Bachelor’s in chemistry or biochemistry AND Master’s in biochemistry, chemical engineering, chemical physics, physics, molecular biology, or geochemistry OR the equivalent.

XI. ARTICULATION INFORMATION

A. Title V Course Classification:
   1. This course is designed to be taken either:
      [ ] Pass/No Pass only (no letter grade possible); or
      X Letter grade (P/NP possible at student option)
   2. Degree status:
      Either X Associate Degree Applicable; or [ ] Non-associate Degree Applicable

B. Moorpark College General Education:
   1. Do you recommend this course for inclusion on the Associate Degree General Education list?
      Yes: X No: [ ] If YES, what section(s)?
      [ ] A1 - Natural Sciences - Biological Science
      X A2 - Natural Sciences - Physical Science
      [ ] B1 - Social and Behavioral Sciences - American History/Institutions
      [ ] B2 - Social and Behavioral Sciences - Other Social Behavioral Science
      [ ] C1 - Humanities - Fine or Performing Arts
      [ ] C2 - Humanities - Other Humanities
      [ ] D1 - Language and Rationality - English Composition
      [ ] D2 - Language and Rationality - Communication and Analytical Thinking
      [ ] E1 - Health/Physical Education
      [ ] E2 - PE or Dance
      [ ] F - Ethnic/Gender Studies

C. California State University(CSU) Articulation:
   1. Do you recommend this course for transfer credit to CSU? Yes: X No: [ ]
   2. If YES do you recommend this course for inclusion on the CSU General Education list?
      Yes: X No: [ ] If YES, which area(s)?
University of California (UC) Articulation:

1. Do you recommend this course for transfer to the UC?  Yes: X  No: 

2. If YES do you recommend this course for the Intersegmental General Education Transfer Curriculum (IGETC)?  Yes: X  No: 

IGETC Area 1: English Communication
- English Composition
- Critical Thinking-English Composition
- Oral Communication

IGETC Area 2: Mathematical Concepts and Quantitative Reasoning
- Mathematical Concepts

IGETC Area 3: Arts and Humanities
- Fine Arts
- Humanities

IGETC Area 4: Social and Behavioral Sciences
- Anthropology and Archaeology
- Economics
- Ethnic Studies
- Gender Studies
- Geography
- History
- Interdisciplinary, Social & Behavioral Sciences
- Political Science, Government & Legal Institutions
- Psychology
- Sociology & Criminology

IGETC Area 5: Physical and Biological Sciences (mark all that apply)
- Physical Science Lab or Physical Science Lab only (non-sequence)
- Physical Science Lecture only (non-sequence)
- Biological Sciences
- Physical Science Courses
- Physical Science Lab or Biological Science Lab Only (non-sequence)
- Biological Science Courses
XII. REVIEW OF LIBRARY RESOURCES
   A. What planned assignment(s) will require library resources and use?
      The following assignments require library resources:
      Research background information for a laboratory experiment using the Library's print and online resources.
   B. Are the currently held library resources sufficient to support the course assignment?
      YES: [X] NO: 
      If NO, please list additional library resources needed to support this course.

XIII. PREREQUISITE AND/OR COREQUISITE JUSTIFICATION
      Requisite Justification for MATH M01

      A. Sequential course within a discipline.
      [ ]

      B. Standard Prerequisite or Corequisite required by universities.
      [X]
      CSU Channel Islands

      C. Corequisite is linked to companion lecture course.
      [ ]

      D. Prerequisite or Corequisite is authorized by legal statute or regulation.
      Code Section: ____________
      [ ]

      E. Prerequisite or Corequisite is necessary to protect the students' health and safety.
      [ ]

      F. Computation or communication skill is needed.
      [ ]

      G. Performance courses: Audition, portfolio, tryouts, etc. needed.
      [ ]
or

Requisite Justification for one year of high school algebra or equivalent with a C grade or higher.

☐ A. Sequential course within a discipline.

☒ B. Standard Prerequisite or Corequisite required by universities.
  CSU Channel Islands

☐ C. Corequisite is linked to companion lecture course.

☐ D. Prerequisite or Corequisite is authorized by legal statute or regulation.
  Code Section: __________

☐ E. Prerequisite or Corequisite is necessary to protect the students' health and safety.

☐ F. Computation or communication skill is needed.

☐ G. Performance courses: Audition, portfolio, tryouts, etc. needed.

XIV. WORKPLACE PREPARATION
CHEM M11: Not Applicable

XV. DISTANCE LEARNING COURSE OUTLINE ADDENDUM

1. Mode of Delivery

☐ Online (course will be delivered 100% online)

☐ Online with onsite examinations (100% of the instruction will occur online, but examinations and an orientation will be scheduled onsite)

☒ Online/Hybrid (a percentage of instruction will be held online and the remaining percentage of instruction will be held onsite)

☒ Lab activities will be conducted onsite

☐ Televideo (Examinations and an orientation will be held onsite)

☐ Teleconference

☐ Other

2. Need/Justification

Improve general student access.
3. Describe how instructors teaching this course will ensure regular, effective contact with and among students.

Synchronous and asynchronous contact will be maintained with students through weekly online classroom presentations, computerized online homework assignments and feedback, onsite lectures and laboratory sessions, and may also include discussion board and chat room interactions.

4. Describe how instructors teaching this course will involve students in active learning.

This course will be taught with 40% online and 60% onsite. The onsite portion consists of introduction to the college online technological platform usage and overall course introduction, three to four written examinations plus cumulative final exam, hands-on laboratories, and multiple discussion sections. The online portion consists of class-wide emails as well as individual student emails to maintain a constant ambience of active communication along with possible discussion board and chat room interactions.

5. Explain how instructors teaching this course will provide multiple methods of content representation.

Students will have access to all lecture notes and are responsible for accessing these prior to class for notetaking. Students will learn onsite through initial course orientation, learn about the selected college-wide technological platform and its usage in the course, take three to four examinations plus the cumulative final exam, and conduct all labs onsite. Instructors may also choose to include audio and video files to supplement lecture material online.

6. Describe how instructors teaching this course will evaluate student performance.

Student grades will be evaluated similar to a traditionally taught course consisting of online homework (15%), quizzes (10%), workshops (5%), examinations and cumulative final exam (50%), and laboratory experiment reports (20%).

XVI. General Education Course Outline Addendum

General Education Division of Learning [check all applicable boxes]:

- [X] Natural Sciences
  - [ ] Biological Science
  - [X] Physical Science
- [ ] Social and Behavioral Sciences
  - [ ] American History/Institutions
  - [ ] Other Social Science
- [ ] Humanities
  - [ ] Fine or Performing Arts
  - [ ] Other Humanities
- [ ] Language and Rationality
  - [ ] English Composition
☐ Communication and Analytical Thinking
☐ Health/Physical Education
☐ Ethnic/Women's Studies

Check either Option 1 or Option 2

☐ OPTION #1: Moorpark College has already received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. Note: This option applies only to technical revisions and updated courses.

☐ OPTION #2: Moorpark College has not received approval from the CSU and/or UC systems for this course to fulfill a GE requirement. This option applies to all new and substantively revised courses.

XVII. Student Materials Fee Addendum
CHEM M11: Not Applicable

XVIII. Repeatability Justification Title 5, Section 55041
CHEM M11: Not Applicable

XIX. CURRICULUM APPROVAL
A. Course Information:
   1. Discipline: CHEMISTRY
   2. Discipline Code and Number: CHEM M11
   3. Course Revision Category: Substantial Course Revision

B. Course Proposed By:
   1. Originating Faculty Robert Keil 02/04/2013
   2. Faculty Peer: Robert Keil 10/31/2012
   4. Department Chair: Robert Keil 10/31/2012
   5. Division Dean: Lisa Miller 10/31/2012

C. Approved By:
   Curriculum Chair: Mary Rees 03/07/2013
   Executive Vice President: Jane Harmon 02/26/2013
   Articulation Officer: Letrisha Mai 02/21/2013
   Librarian: Mary LaBarge 02/23/2013

D. Implementation Term and Year: Fall 2014

E. Approval Dates:
   1. Approved by Moorpark College Curriculum Committee: 03/05/2013
   2. Approved by Board of Trustees (if applicable): __________
   3. Approved by State (if applicable): 01/06/2014

http://www.curricunet.com/moorpark/reports/course_outline_html.cfm?courses_id=3220