I. CATALOG INFORMATION
A. Discipline: CHEMISTRY
B. Subject Code and Number: CHEM M13
C. Course Title: Introductory Chemistry II
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:
   Introduces fundamental concepts of general chemistry including kinetics, equilibria, pH, thermodynamics, electrochemistry, and nuclear chemistry. Covers topics in organic and biochemistry including structure, nomenclature, and reactions of organic compounds and metabolism of carbohydrates, lipids, proteins, enzymes, and nucleic acids.
J. Entrance Skills
   *Prerequisite: No X Yes Course(s)
   CHEM M11, CHEM M12 or CHEM M12H or equivalent college course with a grade of C or higher.
   *Corequisite: No X Yes Course(s)
   Limitation on Enrollment: No X Yes
   Recommended Preparation: No X Yes Course(s)
   Other: No X Yes
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>determine how rates of chemical reactions are measured, written, and used to deduce probable reaction mechanisms as well as describe the transition state and collision theory of reactions that produce effective collisions.</td>
</tr>
<tr>
<td></td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>2</td>
<td>write and solve equilibrium constant expressions for chemical reactions; distinguish between a steady state and an equilibrium system; and apply Le Chatelier's Principle to various mixtures.</td>
</tr>
<tr>
<td></td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>3</td>
<td>state the general principles of Arrhenius and Bronsted-Lowry theories; explain the nature of the pH scale as well as perform various pH calculations; identify buffer solutions and predict their pH; and predict whether substances are acidic, basic, or neutral.</td>
</tr>
<tr>
<td></td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>4</td>
<td>state the First, Second, and Third Laws of Thermodynamics; define enthalpy, entropy, Gibbs Free Energy, and calculate changes in enthalpy, entropy, and Gibbs Free energy in a chemical reaction for standard conditions in order to determine overall spontaneity.</td>
</tr>
<tr>
<td></td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>5</td>
<td>determine the oxidation state of an element in a compound, balance redox reactions using the half-reaction method, and identify the oxidized species, reduced species, the oxidizing agent, and the reducing agent in a redox reaction; discuss the nature of standard reduction potentials and reference standard reduction potential tables to solve overall standard cell potentials for a galvanic cell; and understand how a lead-acid battery functions.</td>
</tr>
<tr>
<td></td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
</tbody>
</table>

K. Other Catalog Information:

No credit if taken after CHEM M07A/CHEM M07B.
<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>detected and measured; and compare and contrast the processes of nuclear fission and fusion.</td>
<td>written expression of results and conclusions, cumulative final exam.</td>
</tr>
<tr>
<td>7</td>
<td>analyze, name, and draw structures for saturated hydrocarbons, unsaturated hydrocarbons, aromatic compounds, alcohols, ethers, and esters; predict the outcome of various organic reactions.</td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>8</td>
<td>classify carbohydrates, lipids, proteins, enzymes, nucleic acids, and examine their relationship to the human body.</td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>9</td>
<td>demonstrate an understanding of metabolism and biochemical energy production.</td>
<td>quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.</td>
</tr>
<tr>
<td>10</td>
<td>experiment with kinetics, acids and bases, buffer solutions, redox reactions, alkanes, alkenes, alcohols, ethers, esters, carbohydrates, lipids, proteins, and enzymes.</td>
<td>laboratory-based applications (including written expression of results and conclusions, identification of unknown samples, and duplication of experimental procedures).</td>
</tr>
</tbody>
</table>

### III. COURSE CONTENT

<table>
<thead>
<tr>
<th>Estimated %</th>
<th>Topic</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lecture</strong></td>
<td>(must total 100%)</td>
<td></td>
</tr>
<tr>
<td>6.00%</td>
<td>Chemical Kinetics: Rates of Chemical Reactions; Factors that Affect Reaction Rates; Rate Law Determination using Method of Initial Rates; Activation Energy; Reaction Mechanisms; Effect of Catalysts.</td>
<td>1</td>
</tr>
<tr>
<td>8.00%</td>
<td>Principles of Chemical Equilibrium: Mass Action Expression; Steady State versus Equilibrium System; Equilibrium Constant Determination; Le Chatelier's Principle.</td>
<td>2</td>
</tr>
<tr>
<td>8.00%</td>
<td>Acid-Base Equilibrium: Arrhenius and Bronsted-Lowry Theories; the pH Scale; Strong and Weak Electrolytes and their Reactions; Acid-Base Properties; Buffer Solutions and their expected pH; Titrations.</td>
<td>3</td>
</tr>
<tr>
<td>Percentage</td>
<td>Topics</td>
<td>Page</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>6.00%</td>
<td>Chemical Thermodynamics: First, Second, and Third Laws of Thermodynamics; Enthalpy, Entropy, Gibbs Free Energy, and their Applications to Spontaneity.</td>
<td>4</td>
</tr>
<tr>
<td>6.00%</td>
<td>Electrochemistry: Oxidation States; Balancing Oxidation-Reduction Reactions and Identifying Oxidized and Reduced Species; Galvanic Cells; Standard Half-Cell and Cell Potentials; Lead-Acid Battery.</td>
<td>5</td>
</tr>
<tr>
<td>6.00%</td>
<td>Nuclear: Types of Radioactive Decay, Rates, and Half-life; Radiation; Nuclear Medicine; Fission and Fusion.</td>
<td>6</td>
</tr>
<tr>
<td>8.00%</td>
<td>Organic: Saturated Hydrocarbons - Alkanes; Nomenclature, Structural Formulas, and Isomerism.</td>
<td>7</td>
</tr>
<tr>
<td>8.00%</td>
<td>Organic: Unsaturated Hydrocarbons - Alkenes, Alkynes, and Aromatic Hydrocarbons; Nomenclature, Structural Formulas, and Isomerism.</td>
<td>7</td>
</tr>
<tr>
<td>8.00%</td>
<td>Organic: Alcohols, Ethers, and Esters - Properties and Reactions.</td>
<td>7</td>
</tr>
<tr>
<td>9.00%</td>
<td>Biochemistry: Carbohydrates - Classification and Chemical Properties of Monosaccharides; Disaccharides and Polysaccharides; Metabolism via Glycolysis; the Citric Acid Cycle; Electron Transport Chain.</td>
<td>8, 9</td>
</tr>
<tr>
<td>9.00%</td>
<td>Biochemistry: Lipids - Characteristics and Reactions of Lipids; Soaps and Detergents; Water-soluble versus Lipid-soluble Vitamins; Steroids; Metabolism via Beta-Oxidation.</td>
<td>8</td>
</tr>
<tr>
<td>9.00%</td>
<td>Biochemistry: Proteins - Characteristics of Proteins; Amino Acids and Peptide Formation; Levels of Protein Structure; Protein Catabolism; Enzymes.</td>
<td>8</td>
</tr>
<tr>
<td>9.00%</td>
<td>Biochemistry: Nucleic Acids - Characteristics of Nucleic Acids; Primary, Secondary, Tertiary, and Quarternary Structures of Nucleic Acids; DNA Double Helix; Replication of DNA, RNA, and Protein Synthesis.</td>
<td>8</td>
</tr>
<tr>
<td><strong>Lab (must total 100%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.00%</td>
<td>Kinetics: The Iodine Clock Reaction and Effects of Catalysts</td>
<td>1, 10</td>
</tr>
<tr>
<td>6.00%</td>
<td>Equilibrium: Le Chatelier's Principle</td>
<td>2, 10</td>
</tr>
<tr>
<td><strong>24.00%</strong></td>
<td>Acids and Bases: Relative Strengths of Acids and Bases, Acid-Base Titrations, and pH Indicators</td>
<td>3, 10</td>
</tr>
<tr>
<td>10.00%</td>
<td>Electrochemistry: Redox Reactions and Electrochemical Cells</td>
<td>4, 5, 10</td>
</tr>
<tr>
<td>6.00%</td>
<td>Organic Chemistry: Molecular Models</td>
<td>7, 10</td>
</tr>
<tr>
<td>12.00%</td>
<td>Organic Chemistry: Synthesis of Esters and Synthesis of Soap</td>
<td>7, 10</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>8.00%</td>
<td>Organic Chemistry: Comparison of Saturated, Unsaturated, and Aromatic Hydrocarbons</td>
<td>7, 10</td>
</tr>
<tr>
<td>6.00%</td>
<td>Biochemistry: Determination of Vitamin C in Foods</td>
<td>8, 9, 10</td>
</tr>
<tr>
<td>6.00%</td>
<td>Biochemistry: Fermentation</td>
<td>9, 10</td>
</tr>
<tr>
<td>6.00%</td>
<td>Biochemistry: Food Tests</td>
<td>10</td>
</tr>
<tr>
<td>6.00%</td>
<td>Biochemistry: Effects of Penetrating Radiation and Use of the Geiger Counter</td>
<td>6, 10</td>
</tr>
</tbody>
</table>

### IV. TYPICAL ASSIGNMENTS

#### A. Writing assignments

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

1. problem solving exam questions.
2. essay and short exam questions.
3. describe observations and answer questions from laboratory experiments.
4. reflect on readings from the newspaper, journal articles, and/or Internet sources.

#### B. Appropriate outside assignments

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

1. read material from the textbook and laboratory manual.
2. homework problems selected from the textbook.
3. additional problem sets provided by the instructor.
4. readings from the newspaper, journal articles, and/or Internet sources.

#### C. Critical thinking assignments

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

1. class discussions on select example and homework problems.
2. describe and apply a series of steps for obtaining the solution to quantitative chemical problems.

3. compare and contrast different methods of solution to a particular problem.

4. apply chemical principles to discuss various environmental and consumer issues such as toxic wastes, energy sources, high blood pressure, and heart disease.

5. class analysis of laboratory data.

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

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)

Students may also be evaluated on: (1) a research summary report based on an organic or biochemistry related article (2) submitted abstracts, introductions, and conclusions based on various laboratory experiment results; and (3) comparing and contrasting how amino acids link together to form primary, secondary, tertiary, and quaternary protein structures and their applications to current research.

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>
<tbody>
<tr>
<td>CSU Northridge</td>
<td>CHEM 104 &amp; 104L</td>
<td>Introductory Chemistry II</td>
<td>3/1</td>
</tr>
<tr>
<td>San Jose State Univ.</td>
<td>CHEM 30B</td>
<td>Introductory Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CSU Sacramento</td>
<td>CHEM 6B</td>
<td>Introduction to Organic and Biological Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>CSU Fresno</td>
<td>CHEM 3B</td>
<td>Introductory Organic and Biochemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

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
      ☑ Letter grade (P/NP possible at student option)
   2. Degree status:
      Either ☑ 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: ☑ No: ☐ If YES, what section(s)?
      ☐ A1 - Natural Sciences - Biological Science
      ☑ 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: ☑ 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)?

C1 [ ] C2 [ ] D1 [ ] D2 [ ] D3 [ ] D4 [ ] D5 [ ]
D6 [ ] D7 [ ] D8 [ ] D9 [ ] D10 [ ] E [ ]

D. 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 (none-sequence)
- [ ] Physical Science Lecture only (non-sequence)
- [ ] Biological Sciences
- [ ] Physical Science Courses
- [ ] Physical Science Lab or Biological Science Lab Only (non-
A. Sequential course within a discipline.

1. Analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling.

2. Calculate and measure mass, volume, and length using laboratory devices properly and know their relative precision.

3. 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.

4. Classify matter, distinguish between physical and chemical changes, comprehend the principles of chemical reactions and energy relationships, and perform various stoichiometric calculations.

5. List and describe the distinguishing characteristics of solids, liquids, gases, and solutions.

6. Identify the basic components of the nuclear atom, account for the existence of ions and isotopes, identify the symbols of common elements, draw the structures of molecules and ions, and recognize various inorganic, organic, and biochemical compounds.
7. analyze saturated hydrocarbons, unsaturated hydrocarbons, cyclic compounds, alcohols, aldehydes, ketones, amines, and carboxylic acids and their derivatives.

8. classify carbohydrates, lipids, proteins, and examine their relationship to the human body.

9. formulate an understanding of nucleic acids and their relationship to DNA and RNA.

10. 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.

11. experiment with acids and bases, alkanes, alkenes, alcohols, aldehydes, ketones, amines, carboxylic acids and their derivatives, proteins, DNA, and enzymes.

12. apply laboratory techniques such as chromatography, spectrophotometric analysis, filtration, differential solubilities to separate and analyze mixtures, organic synthesis and product characterization, and molecular modeling.

☐ B. Standard Prerequisite or Corequisite required by universities.

☐ 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.

Requisite Justification for CHEM M12

☐ X A. Sequential course within a discipline.

1. analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling.

2. 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.

3. use dimensional analysis to perform mathematical conversions and solve problems involving density, energy, stoichiometry, quantum mechanics, solids, liquids, gases, and solutions.

4. classify matter, distinguish between physical/chemical changes and properties, and comprehend the principles of chemical reactions and energy relationships.

5. list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.

6. describe the quantum mechanical model and construct the historical development of the nuclear atom, explain the nature of atomic spectra, and account for trends in chemical periodicity involving atomic and ionic radii, ionization energy, and electronegativity.

7. identify the symbols of common elements, the structures of molecules and ions, and name various inorganic compounds.

8. write balanced molecular, ionic, and net-ionic equations for synthesis, decomposition, combustion, single-replacement, double-replacement, and oxidation-reduction reactions.

9. apply Lewis and VSEPR theories to draw structures and shapes, label electronic and molecular geometries, and predict polarities for molecules and ions.

10. state the general principles of Arrhenius and Bronsted-Lowry acid/base theories, explain the nature of the pH scale as well as perform pH calculations, and identify buffer solutions.

11. 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.

☐ B. Standard Prerequisite or Corequisite required by universities.

☐ 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 CHEM M12H

1. analyze and apply the scientific method to chemistry problems, including developing a hypothesis, hypothesis testing, evaluation, and modeling.

2. 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.

3. use dimensional analysis to perform mathematical conversions and solve problems involving density, energy, stoichiometry, quantum mechanics, solids, liquids, gases, and solutions.

4. classify matter, distinguish between physical/chemical changes and properties, and comprehend the principles of chemical reactions and energy relationships.

5. list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.

6. describe the quantum mechanical model and construct the historical development of the nuclear atom, explain the nature of atomic spectra, and account for trends in chemical periodicity involving atomic and ionic radii, ionization energy, and electronegativity.

7. identify the symbols of common elements, the structures of molecules and ions, and name various inorganic compounds.

8. write balanced molecular, ionic, and net-ionic equations for synthesis, decomposition, combustion, single-replacement, double-replacement, and oxidation-reduction reactions.

9. apply Lewis and VSEPR theories to draw structures and shapes, label electronic and molecular geometries, and predict polarities for molecules and ions.

10. state the general principles of Arrhenius and Bronsted-Lowry acid/base theories, explain the nature of the pH scale as well as perform pH calculations, and identify buffer solutions.

11. 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.

12. critically analyze and discuss practical applications of and recent developments in chemistry.

13. attend and participate in discussions related to chemistry and
general science both at Moorpark College and in the greater community.

14. complete a semester project involving a term paper, poster, and class presentation based on extensive research, collaboration, and critical analysis, and using appropriate citations.

☐ B. Standard Prerequisite or Corequisite required by universities.

☐ 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 or equivalent college course with a grade of C or higher.

☐ A. Sequential course within a discipline.

☐ B. Standard Prerequisite or Corequisite required by universities.

CSU Sacramento, SJSU, CSUN

☐ 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.
XIV. WORKPLACE PREPARATION

CHEM M13: 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 online live classroom presentations, discussion board and chat room interactions, and weekly onsite lectures and laboratory sessions.

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

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

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 printing 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 - 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 homework (10%), quizzes (10%), online participation and discussion questions (10%), examinations (50%), and laboratory experiment reports (20%).

XVI. General Education Course Outline Addendum

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

- Natural Sciences
- Physical Science
- Biological 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 M13: Not Applicable

XVIII. Repeatability Justification Title 5, Section 55041

CHEM M13: Not Applicable

XIX. CURRICULUM APPROVAL

A. Course Information:
   1. Discipline: CHEMISTRY
   2. Discipline Code and Number: CHEM M13
   3. Course Revision Category: Outline Update

   B. Course Proposed By:
1. Originating Faculty: Deanna Franke 10/30/2012
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 12/07/2012
   Executive Vice President: Jane Harmon 11/20/2012
   Articulation Officer: Letrisha Mai 11/13/2012
   Librarian: Mary LaBarge 11/13/2012

D. Implementation Term and Year: Fall 2013

E. Approval Dates:
   1. Approved by Moorpark College Curriculum Committee: 12/04/2012
   2. Approved by Board of Trustees (if applicable): __________
   3. Approved by State (if applicable): __________