

**I. CATALOG INFORMATION**A. Discipline: CHEMISTRYB. Subject Code and Number: CHEM M12C. Course Title: Introductory Chemistry I

D. Credit Course units:

Units: 4Lecture Hours per week: 3Lab Hours per week : 3Variable Units : No

E. Student Learning Hours:

Lecture Hours:

Classroom hours: 52.5 - 52.5

Laboratory/Activity Hours:

Laboratory/Activity Hours 52.5 - 52.5**Total Combined Hours** in a 17.5 week term: 105 - 105

F. Non-Credit Course hours per week \_\_\_\_\_

G. May be taken a total of:  1  2  3  4 time(s) for creditH. Is the course co-designated (same as) another course: No  Yes   
If YES, designate course Subject Code & Number: \_\_\_\_\_

I. Course Description:

Introduces basic principles of chemistry with reference to measurement, chemical nature of matter and energy, and atomic theory. Presents the chemical concepts of elements and compounds, the periodic table, bonding, molecular structure, nomenclature, chemical reactions, equations, and calculations.

J. Entrance Skills

\*Prerequisite: No  Yes  Course(s)

MATH M01, one year of high school algebra or equivalent with a grade of C or higher or

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\*Corequisite: No  Yes  Course(s)Limitation on Enrollment: No  Yes Recommended Preparation: No  Yes  Course(s)Other: No  Yes

## K. Other Catalog Information:

Students cannot complete both CHEM M12 and CHEM M12H because credit will only be awarded to the first course completed. (No credit if taken after CHEM M01A).

## II. COURSE OBJECTIVES

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

|   |  | <b>Methods of evaluation will be consistent with, but not limited by, the following types or examples.</b>                             |
|---|--|--|
| 1 | 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), cumulative final exam. |
| 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. | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam. |
| 3 | use dimensional analysis to perform mathematical conversions and solve problems involving density, energy, stoichiometry, quantum mechanics, solids, liquids, gases, and solutions.                                | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam. |
| 4 | classify matter, distinguish between physical/chemical changes and properties, and comprehend the principles of chemical reactions and energy relationships.   | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam. |
| 5 | list and describe the distinguishing characteristics of solids, liquids, gases, and solutions.   | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam. |
| 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                           | quizzes, examinations, laboratory-based applications (including  |

|    |   |   |
|----|---|---|
|    | involving atomic and ionic radii, ionization energy, and electronegativity.   | written expression of results and conclusions), cumulative final exam.  |
| 7  | identify the symbols of common elements, the structures of molecules and ions, and name various inorganic compounds.  | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.  |
| 8  | write balanced molecular, ionic, and net-ionic equations for synthesis, decomposition, combustion, single-replacement, double-replacement, and oxidation-reduction reactions.   | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.  |
| 9  | apply Lewis and VSEPR (Valence Shell Electron Pair Repulsion) theories to draw structures and shapes, label electronic and molecular geometries, and predict polarities for molecules and ions.   | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.  |
| 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.  | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions), cumulative final exam.  |
| 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. | quizzes, examinations, laboratory-based applications (including written expression of results and conclusions, identification of unknown samples, and measurement of known physical constants). |

### III. COURSE CONTENT

| Estimated %                      | Topic   | Learning Outcomes |
|----------------------------------|---|-------------------|
| <b>Lecture</b> (must total 100%) |   |                   |
| 9.00%                            | Measurements in Chemistry - Measurement Systems, Uncertainty and Significant Figures, Scientific Notation, Conversion Factors and | 2                 |

|                              |  |         |
|------------------------------|--|---------|
|                              | Dimensional Analysis, Density and Percent Concepts   |         |
| 7.00%                        | Matter and Energy - Different States and Properties of Matter, Physical and Chemical Changes, Mixtures and Substances, Temperature Conversions, Specific Heat, Conservation of Matter and Energy   | 3, 4    |
| 6.00%                        | Chemical Nomenclature - Classification of Compounds, Ionic Compounds, Binary Molecular Compounds, Binary Acids and Ternary Oxyacids  | 7       |
| 9.00%                        | Chemical Reactions - Writing and Balancing Molecular Equations, Ionic and Net-Ionic Equations, Synthesis, Decomposition, Combustion, Single and Double Displacements, Oxidation-Reduction  | 8       |
| 12.00%                       | Stoichiometry - Mole Concept and Avogadro's Number, Chemical Reactions and the Mole Concept, Limiting and Excess Reactant Yields, Percent Yield, Percent Composition, Empirical and Molecular Formulas   | 2, 3    |
| 9.00%                        | Atomic Theory and Electronic Structure - Dalton's Atomic Theory, Thomson and Rutherford Models of the Atom, Atomic Notation, Isotopes and Ions, Wave Nature of Light and the Bohr Model, Quantum Mechanical Model of the Atom, Electron Configurations | 6, 7    |
| 9.00%                        | Periodic Table - Classification and Properties of Elements, Groups and Periods of Elements, Trends in Atomic and Ionic Radii, Trends in Ionization Energy, Trends in Electronegativity, Trends in Metallic Character                                   | 1, 7    |
| 9.00%                        | Chemical Bonding - Ionic and Covalent Bonds, Lewis and VSEPR Theories, Bond and Molecular Polarity, Bond Strength and Bond Length, Resonance and Structural Isomers  | 1, 9    |
| 9.00%                        | Gases - Properties and Measurement of Gases, Gas Laws and Calculations, Ideal Gas Law and Stoichiometry, Vapor Pressure and Gas Mixtures, Dalton's Law of Partial Pressures, Kinetic Molecular Theory of Gases and Ideality                            | 1, 3, 5 |
| 6.00%                        | Liquids and Solids - Intermolecular Forces, Properties of Liquids and Solids, Changes of State and Dynamic Equilibrium, Structure and Properties of Water, A Closer Look at Hydrogen Bonding   | 1, 4, 5 |
| 9.00%                        | Solutions - Solubility and the Dissolving Process, Types of Solutions, Qualitative and Quantitative Concentration Units, Percent, Molarity, Dilutions, Solution Stoichiometry  | 3, 10   |
| 6.00%                        | Acids and Bases - Properties, Arrhenius and Bronsted-Lowry Theories, Ionization of Water, Concept of pH and Calculations, Indicators and Titrations, Strong and Weak Electrolytes, Buffer Solutions  | 1, 10   |
| <b>Lab (must total 100%)</b> |  |         |
| 5.00%                        | Safety in the chemistry laboratory   | 11      |
| 10.00%                       | Laboratory activities relating to measurements, use of chemistry laboratory equipment, and significant figures   | 2, 11   |
| 10.00%                       | Laboratory activities relating to conservation of mass and percent composition of compounds  | 3, 11   |
| 10.00%                       | Laboratory activities relating to empirical and molecular formulas   | 7, 11   |
| 10.00%                       | Quantitative and qualitative laboratory activities relating to properties of the states of matter (gases, liquids, solids, and solutions)  | 5, 11   |
|                              |  |         |

|        |  |           |
|--------|--|-----------|
| 15.00% | Laboratory activities relating to molecular structure, naming, atomic spectroscopy, and the quantum mechanical model of the atom       | 6, 11     |
| 20.00% | Quantitative laboratory activities relating to stoichiometry   | 2, 3, 11  |
| 20.00% | Laboratory activities relating to reactions of aqueous ions, including acid/base reactions and double and single replacement reactions | 8, 10, 11 |

#### IV. TYPICAL ASSIGNMENTS

##### A. Writing assignments

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

|   |  |
|---|--|
| 1 | evaluation of assigned readings.                             |
| 2 | essay and short answer exam questions.                       |
| 3 | analysis of results from laboratory experiments on Gas Laws. |
| 4 | reflections on readings from newspaper or journal articles.  |

##### 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 | problem sets regarding Lewis Structures.                           |

##### 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. |
| 4 | compare and contrast multiple methods of solution to a particular problem.                           |

#### 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:

- |  |   |   |
|--|---|---|
| <input checked="" type="checkbox"/> Essay Exam           | <input checked="" type="checkbox"/> Classroom Discussion    | <input checked="" type="checkbox"/> Skill Demonstration |
| <input checked="" type="checkbox"/> Problem Solving Exam | <input checked="" type="checkbox"/> Reports/Papers/Journals | <input checked="" type="checkbox"/> Participation       |
| <input checked="" type="checkbox"/> Objective Exams      | <input checked="" type="checkbox"/> Projects                | <input checked="" type="checkbox"/> Other (specify)     |

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

**VII. REPRESENTATIVE TEXTS AND OTHER COURSE MATERIALS**

Moorpark College Chemistry Faculty. Chemistry M12 Lab Manual. L. J. Williamson, 2012.

Tro, Nivaldo J. Introductory Chemistry. 4th ed. Prentice Hall, 2011.

Corwin, Charles. Introductory Chemistry: Concepts and Critical Thinking. 6th ed. Prentice Hall, 2010.

Cracolice, Mark, and Edward Peters. Introductory Chemistry: An Active Learning Approach. 5th ed. Cengage, 2012.

**VIII. STUDENT MATERIALS FEES**

- No  Yes

**IX. PARALLEL COURSES**

| College               | Course Number    | Course Title                                      | Units |
|-----------------------|------------------|---|-------|
| CSU Northridge        | CHEM 103 & 103L  | Introductory Chemistry I and Lab                  | 3 & 1 |
| San Diego State Univ. | CHEM 100         | Introduction to General Chemistry with Laboratory | 4     |
| Cal Poly Pomona       | CHM 103 and 103A | Fundamentals of Chemistry                         | 3 & 1 |
| UC Los Angeles        | CHEM 2           | Introductory Chemistry                            | 4     |
| UC San Diego          | CHEM 4           | Basic Chemistry                                   | 4     |

**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:  No:  If YES, which area(s)?

- A1  A2  A3  B1  B2  B3  B4   
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:  No:

2. If YES do you recommend this course for the Intersegmental General Education Transfer Curriculum (IGETC)? Yes:  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
- Biological Science Lab course
- First Science course is a Special sequence
- Second Science course in a Special Sequence
- Laboratory Activity
- Physical Sciences

IGETC Area 6: Language other than English

- Languages other than English (UC Requirement Only)
- U.S. History, Constitution, and American Ideals (CSU Requirement ONLY)



**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:  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.
- 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 one year of high school algebra or equivalent with a grade of C or higher

- A. Sequential course within a discipline.
- 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

#### XIV. WORKPLACE PREPARATION

CHEM M12: 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 the college technological platform and overall course introduction, four written examinations plus cumulative final exam, hands-on laboratories, and multiple discussion sections. The online consists of 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 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
- Biological Science
  - 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 M12: Not Applicable

## XVIII. Repeatability Justification Title 5, Section 55041

CHEM M12: Not Applicable

**XIX. CURRICULUM APPROVAL**

- A. Course Information:
1. Discipline: CHEMISTRY
  2. Discipline Code and Number: CHEM M12
  3. Course Revision Category: Technical Course Revision
- B. Course Proposed By:
1. Originating Faculty Deanna Franke 11/04/2013
  2. Faculty Peer: Omar Torres 11/05/2013
  3. Curriculum Rep: Ronald Wallingford 11/05/2013
  4. Department Chair: Robert Keil 11/26/2013
  5. Division Dean: Julius Sokenu 11/30/2013
- C. Approved By:
- Curriculum Chair: Jerry Mansfield 12/14/2013
- Executive Vice President: Lori Bennett 12/18/2013
- Articulation Officer: Letrisha Mai 12/04/2013
- Librarian: Mary LaBarge 12/03/2013
- D. Implementation Term and Year: Fall 2014
- E. Approval Dates:
1. Approved by Moorpark College Curriculum Committee: 12/10/2013
  2. Approved by Board of Trustees (if applicable): \_\_\_\_\_
  3. Approved by State (if applicable): \_\_\_\_\_