UC 122960 135

CBM003 ADD/CHANGE FORM

☒ Undergraduate Council	or	☐ Graduate/Professional Studies Council
☐ New Course ☒ Course Change		☐ New Course ☐ Course Change
Core Category: Life/Phys Sci Effective Fall ~~2013~~ 2014		Effective Fall 2013

1. Department: CHEM College: NSM
2. Faculty Contact Person: Bott Telephone: 3-2771 Email: sbott@uh.edu
3. Course Information on New/Revised course:
   - Instructional Area / Course Number / Long Course Title: CHEM / 1301 / Foundations of Chemistry
   - Instructional Area / Course Number / Short Course Title (30 characters max.) CHEM / 1301 / FOUNDATIONS OF CHEMISTRY
   - SCH: 3 Level: FR CIP Code: 40.0501.0002 Lect Hrs: 3 Lab Hrs: 0

RECEIVED APR - 4 2013

4. Justification for adding/changing course: **To meet core curriculum requirements**
5. Was the proposed/revised course previously offered as a special topics course? ☐ Yes ☐ No
   If Yes, please complete:
   - Instructional Area / Course Number / Long Course Title: ____ / ____ / ____
   - Course ID: _____ Effective Date (currently active row): _____
6. Authorized Degree Program(s): _____
   - Does this course affect major/minor requirements in the College/Department? ☒ Yes ☐ No
   - Does this course affect major/minor requirements in other Colleges/Departments? ☒ Yes ☐ No
   - Can the course be repeated for credit? ☐ Yes ☒ No (if yes, include in course description)
7. Grade Option: Letter Instruction Type: Lect (Note: Lect/Lab info. must match item 3, above.)
8. If this form involves a change to an existing course, please obtain the following information from the course inventory: Instructional Area / Course Number / Long Course Title
   ____ / ____ / ____
   - Course ID: _____ Effective Date (currently active row): _____
9. Proposed Catalog Description: (If there are no prerequisites, type in "none".)
   Cr. 3. (3-0). Prerequisite: credit for or concurrent enrollment in MATH 1310 or MATH 1311. Credit may not be applied toward a degree for both CHEM 1301 and CHEM 1331or CHEM 1372. Concepts and principles of chemistry.
10. Dean's Signature: _____ Date: _____

    Print/Type Name: Ian Evans

REQUEST FOR COURSES IN THE CORE CURRICULUM

Originating Department or College: Chemistry
Person Making Request: Simon Bott Telephone: x3-2771
Email: sbott@uh.edu
Dean's Signature: _____ Date: 11/12/12

Course Number and Title: CHEM 1301, Foundations of Chemistry
Please attach in separate documents:

X Completed CBM003 Add/Change Form with Catalog Description

X Syllabus

List the student learning outcomes for the course (Statements of what students will know and be able to do as a result of taking this course. See appended hints for constructing these statements):
1. Describe matter and its measurement, including calculations done on measurements. 2. Demonstrate an understanding of basic chemical nomenclature. 3. Relate basic atomic theory to the trends of the periodic table. 4. Correlate chemical equations and stoichiometry. 5. Recognize & solve reactions occurring in aqueous solution. 6. Relate the electronic structure of an atom to the trends on the periodic table. 7. Demonstrate an understanding of chemical bonding and its relationship to molecular structure. 8. Describe the relationship between pressure, volume, temperature, and number of moles of a gas and calculate changes in quantity when the pressure, volume, or temperature of a gas is varied. 9. Apply critical thinking skills to solve problems in chemistry.

Component Area for which the course is being proposed (check one):
***Note:** If you check the Component Area Option, you would need to also check a Foundational Component Area.

☐ Communication
☐ Mathematics
☐ Language, Philosophy, & Culture
☐ Creative Arts
X Life & Physical Sciences
☐ American History
☐ Government/Political Science
☐ Social & Behavioral Science
☐ Component Area Option

Competency areas addressed by the course (refer to appended chart for competencies that are required and optional in each component area):

X Critical Thinking	X Teamwork
X Communication Skills	☐ Social Responsibility
X Empirical & Quantitative Skills	☐ Personal Responsibility

Because we will be assessing student learning outcomes across multiple core courses, assessments assigned in your course must include assessments of the core competencies. For each competency checked above, indicated the specific course assignment(s) which, when completed by students, will provide evidence of the competency. Provide detailed information, such as copies of the paper or project assignment, copies of individual test items, etc. A single assignment may be used to provide data for multiple competencies.

Critical Thinking:
Questions on midterm exams will assess critical thinking. Particular examples include questions from (see attached syllabus for detailed learning outcomes) 3C, 3F, 4C, 5C, 6C, 6G, 7C, 7H

Communication Skills:
Students are required to write a paper on a chemical element of their choice.

Empirical & Quantitative Skills:
There are obviously numerous opportunities to assess these in a chemistry class. Again, questions on midterm exams that are associated with Learning Outcomes 1, 4, 5, 8.

Teamwork:
Students are required to submit a group project (written report) that will be used to assess this competency. We anticipate that a university-wide rubric will be available to help with this assessment.

Social Responsibility:
n/a

Personal Responsibility:
n/a

Will the syllabus vary across multiple section of the course? ☐ Yes X No

If yes, list the assignments that will be constant across sections:
Click here to enter text.

Inclusion in the core is contingent upon the course being offered and taught at least once every other academic year. Courses will be reviewed for renewal every 5 years.

The department understands that instructors will be expected to provide student work and to participate in university-wide assessments of student work. This could include, but may not be limited to, designing instruments such as rubrics, and scoring work by students in this or other courses. In addition, instructors of core courses may be asked to include brief assessment activities in their course.

Dept. Signature: _____

The following courses have been reviewed and approved by the NSM Curriculum Committee to meet the new core requirements. Given the length of the individual submissions I have elected to submit these requests by electronic means only.

Natural Sciences: Core Courses

BIOL 1309 – Human Genetics and Society

BIOL 1310 – General Biology

BIOL 1320 – General Biology

BIOL 1361 - Introduction to Biological Science I

BIOL 1362 - Introduction to Biological Science II

CHEM 1301 – Foundations of Chemistry

CHEM 1331 – Fundamentals of Chemistry I

CHEM 1332 – Fundamentals of Chemistry II

GEOL 1302 - Introduction to Global Climate Change

GEOL 1330 - Physical Geology

GEOL 1340 - Introduction to Earth Systems

GEOL 1350 - Introduction to Meteorology

GEOL 1360 - Introduction to Oceanography

GEOL 1376 - Historical Geology

PHYS 1301 - Introductory General Physics I

PHYS 1302 - Introductory General Physics II

PHYS 1321 - University Physics I

PHYS 1322 - University Physics II

Mathematics: Core Courses

MATH 1310 – College Algebra

MATH 1311 – Elementary Mathematical Modeling

Math/Reasoning: Core Courses

COSC 1306 – Computer Science and Programming

MATH 1330 - Precalculus

MATH 1431 - Calculus I

MATH 1432 – Calculus II

MATH 2311 – Introduction to Probability and Statistics

Writing in the Disciplines: Core Courses

BCHS Biochemistry Lab II

BIOL 3311 – Genetics Lab

PHYS 3313 – Advanced Lab I

Ian Evans

Associate Dean

4/4/13

CHEM 1301
Fall 2012

INSTRUCTOR: Simon Bott, Room 138-A, Fleming Building (713-743-2771), sbott@uh.edu
Initial Office Hours: 9:00 – 10:00 am every day but Wednesday or by appointment.

TEXT: Special version of "Basic Chemistry" by Zumdahl and Dacoste, 7th Ed. Available only at local bookstores

PHILOSOPHY: This class is offered primarily to those students who have no interest in pursuing a career in science. The goal of the class, therefore, is to demonstrate to you the fascinating and relevant nature of chemistry. In order to meet this goal, we will utilize classroom discussion and demonstrations, paper writing, mathematical manipulations and outside reading (using both hard copy and computer resources) as well as traditional lecture classes. The grading scheme is designed to give credit both to students who understand the material and to those who want to understand but are, through no fault of their own, "chemically challenged".

READING: Read ahead of the progress of class; solve problems at the end of each chapter; work through and understand examples in chapter.

CALCULATORS: Some of this class involves calculations. We will do these both with and without calculators. When we need to use them, you MUST have a NON-PROGRAMMABLE scientific (with scientific notation and logarithms) calculator that you can use.

ATTENDANCE: You are encouraged to attend class both as an aid to understanding the material as well as to take the quizzes (which are an important part of your final grade!). In addition, I am not prepared to help a student who has multiple unexcused absences from class. ALL EXAMS are compulsory. **Absolutely no make-up exams or quizzes will be given.**

NOTES:

1. All drops are the responsibility of the student. Last day is **NOVEMBER 2nd!!!**
2. ALL GRADED WORK SHOULD BE DONE INDIVIDUALLY. The UH Academic Honesty Policy is in effect.
3. Any students who need special accommodations are responsible for communicating these to me WITHIN THE FIRST WEEK OF CLASS.
4. Pagers, cell phones, and other communication devices MUST be turned off throughout class. I reserve the right to confiscate temporarily such devices.

PROVISIONAL SYLLABUS:

We will attempt to cover the whole revised book. Chapter 2 in the original labeling (actually our last chapter) is for you to learn/review yourself.

GRADING: There are a number of components to the grading scheme:

a) There will be 3 **exams** of 20 questions each given during the semester and a **final exam** of 40 questions. The exams will be given via Blackboard in CASA in Garrison Gym. You will need to sign up for the exams via Blackboard. The exams will be available on October 1 -3, October 29 – 31 and November 26 – 28. The final will be given in CASA from December 12 through 14. This will be comprehensive.

b) There will be a number of "pop" **quizzes** given in class and homeworks, which will combine to account for 20 points. These will NOT be announced ahead of time, and will be based on the previous classwork and homework. As part of the quiz grade, there will be a number of Blackboard homeworks assigned during the semester. These may be attempted as many times as desired within the allowed time, and the highest grade will be used.

c) **A paper** will be assigned during the course of the semester an element of your choice in which you focus on the chemistry and applications of the element. This MUST be typed, at least 1000 words long, and feature at least five references, cited correctly. It is due **October 29.** Full details will be given later.

d) A **group project** that covers an area of every day life that has a large chemistry application. The primary focus of the paper should be the chemistry involved. Full details will be given later.

e) **Dedication.** At the end of the semester, students who have shown their dedication will receive an additional 10 points. This may be accomplished by missing no more than one in-class quiz and by attaining at least 80% on each and all Blackboard homeworks.

Your final grade will be based on:

3 exams	60 points	Final exam	40 points
Quiz grade	20 points	Paper	20 points
Group Project	20 points	Dedication Grade	10 points
Total	**170 points**		

The complete method by which letter grades will be assigned will be discussed during the semester. However, students who obtain 90% are guaranteed an A, 80% a B, 70% a C, and 60% a D. **ASSUMING CORRECT ARITHMETIC ON MY PART, GRADE DETERMINATIONS ARE FINAL AND NON-APPEALABLE.**

Learning Outcomes

By the end of this class, the student (you) will be able to:

1. Describe matter and its measurement, including calculations done on measurements.

A. State the basic units of measurement for length, mass, volume and temperature in the SI system.
B. Give the numerical equivalent of selected SI prefixes.
C. Convert temperatures between Fahrenheit, Celsius and Kelvin scales.
D. Express numerical answers to the correct number of significant figures.
E. Solve problems using dimensional analysis, including conversion of units.
F. Solve problems involving density.
G. Distinguish the microscopic and macroscopic views of the three states of matter (solid, liquids and gases).
H. Distinguish among elements, compounds and mixtures.
I. Distinguish between physical and chemical properties and physical and chemical changes.

2. Demonstrate an understanding of basic chemical nomenclature.

A. Write the name and symbol for selected elements.
B. Write the name and symbol for selected polyatomic ions.
C. Write names and formulas for ionic, covalent compounds, acids.

3. Relate basic atomic theory to the trends of the periodic table.

A. Describe forms of matter and their structures at the atomic level.
B. Describe subatomic particles and how there are distributed inside atoms.
C. Explain how a variety of experiments contributed to our understanding of atomic structure.
D. Identify isotopes and use natural abundance data to calculate average atomic mass.
E. Identify the following areas of the periodic table: metals, nonmetals and metalloids; main groups: alkali metals, alkaline earth metals, halogens, transition metals, lanthanides & actinides, and noble gases.
F. Use the periodic table to predict the chemical properties of elements.

4. Correlate chemical equations and stoichiometry.

A. Use Avogadro's number and the definition of the mole in calculations.
B. Write balanced chemical equations that describe chemical reactions.
C. Use balanced chemical equations to relate the mass of a reactant to the mass of a product.
D. Determine the limiting reactant in a chemical reaction.
E. Calculate the theoretical and percent yields in a chemical reaction.

5. Recognize, predict and analyze reactions occurring in aqueous solution.

A. Explain how to make solutions of given concentration.
B. Explain how to dilute solutions to a specified volume or concentration.
C. Solve solution stoichiometry and titration problems.
D. Distinguish among strong, weak and nonelectrolytes in solution.
E. Predict precipitation reactions using solubility rules and write balanced complete and net ionic equations.

6. Relate the electronic structure of an atom to the trends on the periodic table.

A. Solve problems relating frequency, wavelength and energy of electromagnetic radiation.
B. Describe the wavelike and particle-like properties of electromagnetic radiation.
C. Explain the complementary nature of the absorption and emission lines of atomic spectra and relate them to the transitions of electrons between energy levels in atoms.
D. Write electron configurations and draw orbital diagrams of atoms and monatomic ions.
E. Relate position on the periodic table to electron configuration.
F. Describe the scientific contributions of Planck, Einstein, de Broglie, Bohr, Schrodinger, Heisenberg, Pauli and Mendeleyev.
G. Relate to and predict from the periodic table the size of atoms, ionization energies, electronic affinities, ion formation, and reactivity.
H. Describe the periodic trends in metallic and nonmetallic behavior.

7. Demonstrate an understanding of chemical bonding and its relationship to molecular structure.

A. Describe ways in which covalent, ionic, and metallic bonds are alike and those in which they differ.
B. Draw Lewis structures for atoms, ions and covalent compounds, recognizing when multiple bonds, resonance structures, expanded valence shells, incomplete valence shells and odd electrons are needed.
C, Relate macroscopic properties of substances to the type of bonding present.
D. Understand the concept of electronegativity and Use electronegativity differences between bonding atoms to classify bonds as non-polar, polar covalent or ionic.
E. Describe the relationships and predict relative sizes of bond order, length, and energy.
F. Explain the theory of valence-shell electron-pair repulsion (VSEPR)
G. Use VSEPR to predict shapes and bond angles in molecules.
H. Predict the polarity of molecules from their structure.

8. Describe the relationship between pressure, volume, temperature, and number of moles of a gas and calculate changes in quantity when the pressure, volume, or temperature of a gas is varied.

A. Calculate changes in the volume, pressure, temperature and number of moles of a gas using various gas laws including the ideal gas law.
B. Use balanced chemical equations to relate the volume of substances using the stoichiometry of the reaction and the ideal gas law.

9. Apply critical thinking skills to solve problems in chemistry.

A. Describe and apply the scientific method and distinguish between scientific laws and theories.
B. Solve various situational, numerically based problems.
C. Apply chemical principles & theories to explain the trends within chemistry.
D. Use chemical principles to correlated scientific phenom