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**Ohio Articulation Number (OAN)  
Course Submission Form  
2006-2007**



College/University Stark State College of Technology

Course(s) Submitted(Title & Course #) CHM141 General Chemistry I for  
Ohio Articulation Number OSC008

Date 25 January 2007 Course 1 of a 1 Course OAN mapping.

Name and title of individual submitting on behalf of the college/university

Name Dr. Jeff Cramer Title Department Chair & Professor, Science

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Credit Hours 5 qtr \_\_\_\_\_ sem 5

Lecture Hours 3

Laboratory Hours 4 (if applicable)

Pre-Requisites(s) Course work (if applicable)

High School Chemistry 1 year or High School Algebra 2 years or  
CHM101

Placement Score (if applicable)

(Name of test)

(Domain) (Score)

Catalog/Course Description (Includes Course Title and Course #)

CHM141; A broad overview of chemical principles and reactivity. Topics include atomic structure, chemical bonding and molecular structure, inorganic compounds, organic compounds, chemical periodicity,

stoichiometry and nuclear chemistry.

Texts/Outside Readings/Ancillary Materials

Silberberg, Martin S. ***Chemistry The Molecular Nature of Matter and Change*** 4<sup>th</sup> edition. McGraw Hill, New York, 2006 ISBN: 0-07-255820-2

Course Objectives and/or Plan of Work

1. Solve chemical problems using dimensional analysis (factor label) with English to English, metric to English, and metric to metric conversions that include mass, volume, length, energy, concentrations, gases, and chemical equations
2. Report answers with the correct number of significant figures
3. Describe and apply atomic concepts which will include atomic structure and quantum mechanics
4. Describe and apply molecular concepts which will include the periodic table, periodicity, and chemical bonding (ionic, covalent, metallic)
5. Relate chemical relationships between the microscopic-molecular level, the macroscopic-observable level, and symbolic-abstract levels; understand physical properties
6. Relate the mass of a substance to the number of chemical entities comprising it and convert the results of mass analysis into a chemical formula and apply these methods to reactions that occur in solution
7. Classify chemical reactions
8. Describe and apply the concepts of thermochemistry, the heat involved in chemical and physical changes
9. Calculate standard chemical parameters including density, specific heat, heat of solution, gas laws, solution concentrations, and molar masses
10. Observe and measure chemical changes and energy changes in chemical reactions then present the data and develop conclusions using the scientific method
11. Evaluate uncertainty or precision in laboratory experiments and use chemical references to determine % error or accuracy
12. Demonstrate proper laboratory techniques safely such as measurement of mass, volume, and length, titration, and reaction chemistry

Description of Assessment and/or Evaluation of Student Learning

See Attached Syllabus; Laboratory, Homework & Quizzes, and Exams

Master Syllabi and Working Syllabi (if both are used)

***CHM141 General Chemistry I***  
*Science Department, General Studies Division*  
*Stark State College of Technology*

**Syllabus - Spring 2007**

**Instructor:** Dr. Amy Jo Sanders, Ph.D.; Room G204m Ph 330-494-6170 x 4428  
Fax 330-494-0571

Office Hours: Tue: 12:00-2:00p, 4:00-5:00p

Wed: 10:00a-1:00p  
Thurs: 12:00-2:00p, 4:00-5:00p  
Fri 2:00-3:00p

Please call or e-mail for appointment

Email [asanders@starkstate.edu](mailto:asanders@starkstate.edu)

Website <http://www.starkstate.edu>

**Textbook:** Silberberg, Martin S. ***Chemistry The Molecular Nature of Matter and Change*** 4<sup>th</sup> edition. McGraw Hill, New York, 2006  
ISBN: 0-07-255820-2

**Student Study Guide (optional):** Elizabeth Bent Weberg ISBN 0-07-282844-7

**Student Solutions Manual:** Langley and Silberberg ISBN 0-07-282843-9

**Lab Manual:** Experimental Chemistry Laboratory 141 ISBN 0-495-30065-9

**Course Description:** The General Chemistry course is covered in two semesters. The first semester, CHM 141, is designed to introduce the student to the science of chemistry. Chemical concepts such as significant figures, atomic theory, chemical bonding and reactions, stoichiometry, thermochemistry, and periodicity will be presented in the form of chemistry problems that bring together chemistry concepts and mathematical reasoning.

**Course Objectives:**

1. Solve chemical problems using dimensional analysis (factor label) with English to English, metric to English, and metric to metric conversions that include mass, volume, length, energy, concentrations, gases, and chemical equations
2. Report answers with the correct number of significant figures
3. Describe and apply atomic concepts which will include atomic structure and quantum mechanics
4. Describe and apply molecular concepts which will include the periodic table, periodicity, and chemical bonding (ionic, covalent, metallic)
5. Relate chemical relationships between the microscopic-molecular level, the macroscopic-observable level, and symbolic-abstract levels; understand physical properties
6. Relate the mass of a substance to the number of chemical entities comprising it and convert the results of mass analysis into a chemical formula and apply these methods to reactions that occur in solution
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10. Observe and measure chemical changes and energy changes in chemical reactions then present the data and develop conclusions using the scientific method

11. Evaluate uncertainty or precision in laboratory experiments and use chemical references to determine % error or accuracy

12. Demonstrate proper laboratory techniques safely such as measurement of mass, volume, and length, titration, and reaction chemistry

**Prerequisite:** CHM101 Introduction to Chemistry or high school chemistry within past 5 years

**Academic Honesty:** The student is expected to present only his/her own work and reference the work and thoughts of others. This includes citing books, journals and Internet sources. Cheating, plagiarism, and other forms of academic dishonesty are described in the Student Handbook (p.21 Scholastic Honesty and Student Integrity and SSCT Catalog 2001-2003, p.25 "Honesty in Learning").

**Safety:** It is the responsibility of the student to evaluate the risks associated with participation in a laboratory science course. Students may be exposed to chemicals including strong acids ( $H_2SO_4$ ), strong bases (NaOH), volatile and flammable compounds (acetone, methanol, hexane), and heavy metals (mercury thermometers), as well as chemicals such as formaldehyde and glutaraldehyde which may have health effects after prolonged exposure.

Please refer to the MSDS (Material Safety Data Sheets) in each laboratory for further information regarding the potential hazards associated with this class.

Students who are aware of these potential risks and use common sense will have a productive and safe learning experience in the laboratory. Our laboratory sections are designed to include basic introductory activities that are NOT associated with undue risk.

**Grading Scale:**

A	= 90.0 to 100%
B	= 80.0 to < 90.0 %
C	= 70.0 to < 80.0 %
D	= 60.0 to < 70.0 %
F	< 60.0 %

**Grading Criteria:**

Laboratory	25 %
Quizzes, Homework	15 %
Exam 1	15 %
Exam 2	15 %
Exam 3	15 %
<u>Final Exam</u>	<u>15 %</u>
Total	100%

**Exams:** Exams will include multiple choice, essay or short answer questions, and problems to be solved using dimensional analysis

**Examination Make-up:** Exam make-up is only permitted under extraordinary circumstances with the instructor's permission. Documentation may be required at the instructor's discretion. The time and date of the make-up exam is at the instructor's discretion. A penalty may be assessed at the instructor's discretion. Penalty, if applied, shall not exceed 20% of the exam's value. The make-up exam will evaluate the student's learning for the same content, but the exam form shall be determined by the instructor. Students are to discuss absences with their instructors at the earliest possible date.

**Quizzes:** There will be a quiz for each chapter. It will be given the period after the chapter is completed. If you are not present during the quiz time, you will receive a 0. Take-home quizzes may be administered. You must be present during the class when quizzes are handed out and also present during the class when quizzes are due to receive credit. No make-up quizzes will be given under any circumstances. The lowest quiz grade will be dropped.

**Lab:** There are 11 lab experiments for CHM 141. Students are required to participate in each lab experiment. Data is to be obtained and recorded in a laboratory notebook at the time of the experiment. Laboratory notebooks with carbon paper are available in the bookstore. The carbon copies of the day's experimental observations and data will be turned in to the instructor on the day of the experiment. Students will retain the original data and use it to make calculations. The data and calculations will be presented to the instructor in the form of a written lab report. Please see the handout "Writing Laboratory Reports." The reports are due the week following the experiment. Each lab experiment will be worth 100 points. Grades for each lab will be determined as follows:

Lab safety and technique	35 points
Accuracy of data	5 points
Lab report	60 points
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	100 points

There will be two lab exams. These 100 point exams are designed to cover the experimental techniques and learning objectives of the labs preceding the exams. The total number of points possible for the lab is 1300. The lowest lab or practical grade will be dropped for a final total of 1200 points. The final lab grade will be worth 25% of the total course grade. Students must obtain at least 720 points in lab in order to receive a passing grade for the course.

**Lab Attendance:** Missed labs may not be made up. If you are not present during the lab time, you will receive a 0. No make-up labs will be given under any circumstances. The lowest lab grade will be dropped.

***Schedule of Topics (Tentative)-CHM141 General Chemistry 1***

<b>Class #</b>	<b>Tentative Dates</b>	<b>Chapter</b>	<b>Topics/Reading Assignment</b>
<b>1</b>	17 Jan	1	Syllabus 1.1 Some Fundamental Definitions 1.3 The Scientific Approach
<b>2</b>	19 Jan	1	1.2 Chemical Arts 1.4 Chemical Problem Solving 1.5 Measurement
<b>3</b>	24 Jan	1	1.5 Measurement 1.6 Uncertainty and Significant Figures
<b>4</b>	26 Jan	1 2	<b>Quiz Chapter 1</b> 2.1 Elements, Compounds, and Mixtures 2.2 An Atomic View of Matter 2.3 Dalton's Atomic Theory
<b>5</b>	31 Jan	2	2.4 Nuclear Atom Model 2.5 The Atomic Theory 2.6 Elements: A First Look at the Periodic Table 2.7 Compounds: Introduction to Bonding
<b>6</b>	2 Feb	2	2.8 Compounds: Formulas, Names, and Masses 2.9 Mixtures: Classification and Separation
<b>7</b>	7 Feb	2 3	<b>Quiz Chapter 2</b> 3.1 The Mole 3.2 Determining the Formula of an Unknown Compound
<b>8</b>	9 Feb	3	3.3 Writing and Balancing Chemical Equations 3.4 Calculating Amounts of Reactant and Product 3.5 Fundamentals of Solution Stoichiometry
<b>9</b>	14 Feb	3	<b>Quiz Chapter 3</b> Review
<b>10</b>	<b>16 Feb</b>	<b>1-3</b>	<b>Exam I Chapters 1-3</b>
<b>11</b>	21 Feb	4	4.1 The Role of Water as a Solvent 4.2 Writing Equations for Aqueous

			Ionic Reaction 4.3 Precipitation Reactions
<b>12</b>	23 Feb	4	4.4 Acid-Base Reactions 4.5 Oxidation-Reduction (REDOX) Reactions Fuel Cell Module 4.6 Elements in Redox Reactions 4.7 Reversible Reactions – Intro to Equilibrium
<b>13</b>	28 Feb	4 6	<b>Quiz Chapter 4</b> 6.1 Forms of Energy and Their Interconversion 6.2 Enthalpy 6.3 Calorimetry
<b>14</b>	2 March	6	6.4 Stoichiometry of Thermochemical Equations 6.5 Hess's Law 6.6 Standard Heats of Reaction
<b>15</b>	7 March	6 7	<b>Quiz Chapter 6</b> 7.1 The nature of Light 7.2 Atomic Spectra
<b>16</b>	9 March	7	7.3 The Wave-Particle Duality of Matter 7.4 The Quantum-Mechanical Model of the Atom
<b>17</b>	14 March	7	<b>Quiz Chapter 7</b> Review
<b>18</b>	<b>16 March</b>	<b>4,6,7</b>	<b>Exam II Chapters 4,6,7</b>
<b>19</b>	28 March	8	8.1 Development of the Periodic Table 8.2 Characteristics of many-Electron Atoms 8.3 The Quantum Mechanical Model and Periodic Table
<b>20</b>	30 March	8	8.4 Trends in Three Key Atomic Properties 8.5 Atomic Structure and Chemical Reactivity
<b>21</b>	4 April	8 9	<b>Quiz Chapter 8</b> 9.1 Atomic Properties and Chemical Bonds 9.2 The Ionic Bonding Model 9.3 The Covalent Bonding Model

<b>22</b>	11 April	9	9.4 Bond Energy and Chemical Change 9.5 Electronegativity and Bond Polarity 9.6 Metallic Bonding
<b>23</b>	13 April	9 10	<b>Quiz Chapter 9</b> 10.1 Depicting Molecules and Ions with Lewis Structures 10.2 VSEPR Theory and Molecular Shape
<b>24</b>	18 April	10	10.2 VSEPR Theory and Molecular Shape 10.3 Molecular Shape and Polarity
<b>25</b>	20 April	10	<b>Quiz Chapter 10</b> Review
<b>26</b>	<b>25 April</b>	8-10	<b>Exam III Chapters 8-10</b>
<b>27</b>	27 April	11	11.1 Valence Bond Theory and Hybridization 11.2 Orbital Overlap
<b>28</b>	2 May	11	11.3 Molecular Orbital Theory
<b>29</b>	4 May	All	Review
<b>30</b>	<b>9 May</b> <b>*8:00am*</b>	<b>All</b>	<b>Comprehensive Final Exam – *Note time change*</b>

***Lab Schedule (Tentative)***  
***CHM141 General Chemistry I***

Lab # Week #	Date Tentative	Description
<b>1</b>	19 Jan	Laboratory Safety- Film First Day in the Laboratory Expt 1-Measurement
<b>2</b>	26 Jan	Expt 2-Density, Accuracy, Precision and Graphing
<b>3</b>	2 Feb	Expt 3-Separation Technique
<b>4</b>	9 Feb	Expt 4-Quantitative Precipitation
<b>5</b>	16 Feb	Expt 5-The Formula of a Precipitated Compound
<b>6</b>	23 Feb	Open Lab / Review for Practical
<b>7</b>	2 March	Lab Practical I
<b>8</b>	9 March	Expt 6 – Heat Effects and Calorimetry
<b>9</b>	16 March	Expt 7 – Action of Antacid Tablets
<b>10</b>	30 March	Expt 8 – Synthesis of Alum

<b>11</b>	13 April	Expt 9 – Synthesis of Aspirin and Oil of Wintergreen
<b>12</b>	20 April	Expt 10 – Lewis Structures and Models
<b>13</b>	27 April	Expt 11 - Molecular Polarity and Chromatography / review
<b>14</b>	4 May	Lab Practical II

### **College Wide Student Outcomes**

Stark State College has identified five college wide general education goals which represent the knowledge, skills, and abilities needed by students who graduate from our institution.

The goals indicated are addressed in this course.

- 1) Communication Skills (Written/Oral)
- 2) Computational Skills
- 3) Computer Literacy Skills
- 4) Critical Thinking Skills
- 5) Interpersonal Skills/ Professionalism

Additional Documentation

None

OBR Use

Action

Approved	
Additional Information Requested	
Rejected	
Date	

## **Ohio Articulation Number Form Directions**

This form is used to submit your course information to the Ohio Board of Regents, for all courses that make up OAN requirements. This document is a form, so the only fields that need to be filled in can be. When you open this, make sure the top of the screen, where the name of the document is displayed, says "Document1" or something similar to that. When you open this form from a location other than inside of word, it creates a blank template to fill in. Please fill it in with the appropriate course information from your institution. All of the fields in this document are expandable, and will grow to fit as much data in them as you need.

Once you are done submitting your course information, you need to save this file. Since Word opened a blank version of this file, so you will need to rename is it to save it. Under file, choose "Save as" and then input the name of the file. The naming scheme for this form is Institution-Year-OAN number-Course Title.

Example, if you were ABC Community College, and you were submitting your Calculus110 course, the name of the file would be ABC-2005-OMT005-Calculus110. If two (or more) courses are required to fulfill that same OAN, you would submit ABC-2005-OMT005-Calculus110Calculus111.

When you are done with your submissions, please send them electronically to the Ohio Board of Regents so we can keep your information on file.