Bergen Community College
Division of Mathematics, Science and Technology
Physical Science Department

Course Syllabus
CHM–102 Chemistry in Context

COURSE DESCRIPTION:
CHM–102 Chemistry in Context is a student-centered approach for non-science majors to learn fundamental chemistry and its linkage to consumer issues, public policy, business and international affairs. Core topics include chemistry terminology, formulas, reactions, scientific measurements, graphing, shapes of molecules, chemical toxicity, green chemistry, consumer chemistry and energy sources. Laboratory activities emphasize fundamental concepts and measurements. Use of scientific and governmental websites, papers, oral presentations and discussion groups draw on students' major fields of study.

CREDITS/HOURS: 3 hr lecture, 3 hr lab, 4 credits

PREREQUISITES: MAT-011 or equivalent by placement as a result of a basic skills placement test

GENERAL ED COURSE: Yes

STUDENT LEARNING OBJECTIVES: As a result of meeting the requirements in this course, students will be able to:

1. Define and explain basic technical terms used in chemistry.
2. Write names and formulas for simple compounds.
3. Use scientific and metric units correctly.
4. Use conversion factors to solve problems.
5. Apply basic chemistry laws.
6. Write a balanced chemical equation.
7. Solve simple stoichiometry problems.
8. Identify and name important acids and bases.
9. Interpret the enthalpy changes of chemical processes.
10. Explain the wave nature and particle nature of light.
11. Explain the reasons for the changes in the ozone layer and health consequences.
12. Identify the causes of indoor and outdoor air pollution, greenhouse gasses, ground and water pollution and resulting health consequences.

13. Discuss the pros and cons of efforts to solve local and global pollution, nutrition, and medicine issues and the consequences on economies, living standards and societies.
14. Explain Green Chemistry using guided and independently researched data.
15. Access government (e.g. EPA, NASA, NOAH) and scientific websites, download scientific data and present data in tabular and/or chart form in a short written or poster report form and an oral (15 to 20 min) presentation.
16. Apply the scientific method and increase critical thinking skills.

ASSESSMENT MEASURES:

The student learning objectives will be assessed by:

1. Graded homework problems assigned from the text;
2. Written assignments, short papers and quizzes;
3. Laboratory experiments and exercises;
4. Website searches for scientific data;
5. Oral presentation on a specific chemistry-related scientific topic;
6. Written examinations and an optional comprehensive final examination.

BOOKS: Text: Chemistry in Context: Applying Chemistry to Society. 9th. Edition. B.D. Fahlman, K.L. Purvis-Roberts, J.S. Kirk, A.K. Bentley, P.L. Daubenmire, J.P. Ellis, and M.T.Mury; McGrawHill; New York, NY; 2018.
Bound Book: ISBN# 978-1-259-63814-5.
Loose Leaf: ISBN# 978-1-260-15176-3

Lab Manual: Laboratory Manual for Chemistry in Context: Applying Chemistry to Society *9th Edition. J.A. Tripp, L. McKenzie, Editors.* McGrawHill; New York, NY; 2018. *ISBN# 978-1-259-92013-4*

COURSE CONTENT:

Chapters 1 to 8 are the core chapters for this course.

Chapter 1: Portable Electronics: The Periodic Table in the Palm of your Hand
Matter: Elements and Atoms. Pure Substances: Elements and Compounds. Molecular and Ionic Compounds. Molecules and Chemical Formulas. Chemical Changes: Law of Conservation of Mass. Scientific Notation.

Chapter 2: The Air We Breathe
Respiration. The Troposphere: Air and its Composition. Outdoor Air Pollution: Risks and Origins. Fuel Use and Consequences. Green Chemistry. Indoor Air Quality. Naming Molecular Compounds.

Chapter 3: Radiation from the Sun
Electromagnetic Spectrum. Wavelength, Frequency, Energy and Photons. Radiation and Matter. Molecular Models, Shape and Vibration. Stratospheric Ozone. Unintended Consequences from CFC Use. The Antarctic Ozone Hole. Why Sunscreens.

Chapter 4: Climate Change
Carbon: Humans, Fuels, and the Carbon Cycle. Combustion Reactions. Molecules, Moles and Molar Mass. Coal, Petroleum, Energy and Efficiency. Green House Gases, Climate Modeling, The Question of Global Warming.

Chapter 5: Energy from Combustion
Fossil Fuels. Potential and Kinetic Energy. Breaking and Forming Chemical Bonds. Endothermic and Exothermic Reactions. Energy of Activation. Crude Oil and Gasoline. Energy Efficiency. Newer Sources of Energy.

Chapter 6: Energy from Alternative Sources
Nuclear, Solar, Wind and Geothermal. Risks and Benefits.

Chapter 7: Energy Storage
Batteries: Oxidation and Reduction Reactions. Rechargeable Batteries. Supercapacitors and Fuel Cells. Hybrid Vehicles. Hydrogen as a Fuel.

Chapter 8: Water Everywhere: A Most Precious Resource
Water: Structure, Properties and Hydrogen Bonding. Salt Water, Surface Water and Ground Water. Ions, Electrolytes, Covalent Compounds and Solutions. Pollutants: Federal Water Legislation and Water Purity. Acids, Bases. and Neutralization Reactions. pH. Acid Rain. Fresh Water from Salt Water.

The instructor will choose 2 to 3 additional chapters from the following.

Chapter 9: The World of Polymers and Plastics
Polymers. Plastics – The Big Six. Density. Recycling and Reusing.

Chapter 10: Brewing and Chewing
Taste and Smell. Chemistry in the Kitchen. Microwave Cooking. Density: The Hydrometer. Fermentation. Extraction: Coffee and Tea.

Chapter 11: Nutrition
Malnutrition and Undernourishment. Fats: Saturated and Unsaturated. Carbohydrates: Sugars and Starch. Proteins: Amino Acids. Food for Energy. Vitamins and Minerals. Food Security: Feeding a Hungry World.

Chapter 12: Health and Medicine
Fighting Equilibrium. Buffer Systems. Carbon: The Building Block of Life. Introduction to Organic Chemistry. Functional Groups. Modern Drug Design.

Chapter 13: Genes and Life
Double Helix: DNA and Protein. Structure, Shape and Function. Genetic Engineering. The GMO debate.

Chapter 14: Who Killed Dr. Thompson? A Forensic Mystery

Supplementary Reading Material:

1. General Chemistry, 8th Edition, Raymond Chang; McGraw Hill, New York; 2005.

2. Chemistry in Context: Applying Chemistry to Society. 8th. Edition. C.H. Middlecamp, M.T. Mury, K.L. Anderson, A.K. Bentley, M.C. Cann and J.P. Ellis, K.L. Purvis-Roberts; McGrawHill; New York, NY; 2012.
ISBN# 978-0-07-352297-5

Other Requirements:

A scientific calculator is required.

General Grading Policy:

A.	Unit Examinations (a minimum of 3), Final Exam and Quizzes	50 %
B.	Papers, homework, Oral Presentations and Discussion Groups	25 %
C.	Laboratory Work	25 %

D. Additional policies:

1. Late work is not accepted.
2. Any examination not taken will receive a grade of zero. Make - up examinations will be administered in accordance with the instructor's policy.
3. Any student caught cheating (including using unauthorized formula sheets of any kind) will receive a grade of zero on that particular exam/test. That zero cannot be replaced by any other grade. Please read The Bergen Community College Statement on academic integrity as found in the college catalog and BCC Student Handbook.
4. At the end of the semester, the grade on the final examination may be substituted for the lowest unit grade for the purpose of calculating the course grade provided that the final examination grade is higher than the lowest examination grade. At the discretion of the instructor, this policy may be somewhat modified.
5. Exams will include a writing component in the form of a short essay or paragraph.

Instructor's Grading Policy:
Will be provided separately by the individual instructor

Attendance/Lateness Policy:
All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

Other Policies:
Electronic Devices:
The use of portable electronic devices such as pagers and cell phones is not permitted while class is in session. Please silence these devices before entering class.

The use of cell/smart phone calculators is not permitted.

Code of Student Conduct:
Students are encouraged to read, understand and follow the rules and standards of conduct as explained in the BCC Student Handbook. The Student Handbook is available in the Office of Student Life and on the BCC website.

Student and Faculty Support Services:
Students experiencing difficulty with the arithmetic or problem solving aspects of this course should acquaint themselves with the services of the Tutoring Center.

The BCC Library provides extensive support services for student research.

Faculty office hours may be a productive vehicle for assistance in understanding the course material.

Services for Students with Disabilities:
A wide variety of services are available to students with documented disabilities through the Office of Specialized Services (OSS). For further information, go to the OSS website:

www.bergen.edu/oss or go to Room L-115.

FACULTY ABSENCE PROCEDURE:

Cancelled classes are listed under class cancellations at bottom of the BCC website page.

Under no circumstances are notices regarding class cancellations taped to classroom doors.

If students find a class cancelled which has not been listed, they should report this to the Divisional Dean's Office, A-304 or the Evening Office C-107.

All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, pay your bill, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about WebAdvisor or to sign up online, visit <http://go.bergen.edu>! While there, please make sure you give us your preferred email address. You'll find directions how to do this at <http://go.bergen.edu/email>.

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CHM–102 Chemistry in Context Laboratory Schedule

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The Instructor will select appropriate experiments from the list.

Week	Topic	Page
1	Check in; Safety; Instructor should distribute and discuss Divisional	vi

	Safety rules for the Chemistry Laboratory. Teach Basic Laboratory Techniques. Review arithmetic. Explain Oral presentation.	1, 3
2	Experiment 1: Preparation and Properties of Gases in Air	21
3	Experiment 3: Graphing Exercices. and/or Computer Exercices: Good Ozone (up there); Bad Ozone (down here)	33
4	Experiment 6: Color and Light Experiment 8: Molecular Models, Bonds and Shapes.	53 69
5	Chemical Reactions: Handout Experiment 11: Verifying Molar Ratios in Chemical Reactions	 91
6	Experiment 13: Comparing the Energy Content of Fuels	99
7	Conductivity: Electrolytes and Ions: Handout and/or Experiment 16: Detecting Ions in Solutions	 119
8	Experiment 17: Exploring Electrochemistry Experiment 19: Reactions of Acids with Common Substances Acidity and pH: Using a pH meter (oral directions)	127 147
9	Experiment 20: Characterizing Acidic and Basic Materials Experiment 33: Analysis of Vinegar	153 223
Start Oral Reports		
10	Oral Reports; Computer Exercise: Acid Rain Experiment 21: Acid Rain	 159
11	Oral Reports Experiment 22: Investigating Solubility	 163
12	Oral Reports Experiment 24: Identifying Common Plastics	 175
13	Oral Reports Synthesizing Aspirin (Handout)	
14	Experiment 31: Measuring the Sugar Content in Beverages	203
15	Check Out/Student Assessment of Learning Gains	

All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, pay your bill, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about WebAdvisor or to sign up online, visit <http://go.bergen.edu>! While there, please make sure you give us your preferred email address. You'll find directions how to do this at <http://go.bergen.edu/email>.