

**DEREE COLLEGE SYLLABUS FOR: CH 1002 LE PRINCIPLES OF CHEMISTRY**

**UK LEVEL: 4**  
**UK CREDITS: 20**  
**US CREDITS:3/2/4**

(Updated Fall 2022)

**PREREQUISITES:**

No prerequisites

**CATALOG DESCRIPTION:**

An introduction to chemical science and the chemistry of everyday life. The course presents fundamental principles of chemistry such as atomic theory, chemical bonding, chemical reactions, states of matter, nuclear chemistry as well as basic concepts of inorganic chemistry. Focus is given to chemical applications and their relevance to the natural environment.

**RATIONALE:**

Principles of Chemistry is a course designed to provide a general chemistry background to environmental studies majors and to other interested students. Chemistry is a rapidly growing field and is essential in understanding our natural environment. Having a basic knowledge on the atom and its structure, the way atoms connect to form molecules, the properties of chemical substances and the way they react helps students understand the science in their everyday life and provides an essential background and tool for students who wish to pursue studies and careers in the area of life and environmental sciences.

**LEARNING OUTCOMES:**

As a result of taking this course, the student should be able to:

1. Demonstrate knowledge and understanding of core concepts and principles of chemical science on the following topics: properties of matter and energy, atomic structure, periodicity and properties of the elements, chemical bonding, chemical reactions, quantitative chemistry, states of matter, acids and bases, nuclear chemistry and organic chemistry.
2. Relate chemical principles and applications to environmental, economic and social issues.
3. Demonstrate knowledge and understanding of the scientific method and how it applies to the study of chemistry.
4. Develop skills for using basic methods in chemistry, including the ability to use appropriate laboratory and field equipment and to acquire, process and evaluate data.

**METHOD OF TEACHING AND LEARNING:**

In congruence with the learning and teaching strategy of the college, the following tools are used:

- Class lectures, interactive learning (class discussions, group work), video presentations, and practical problems solved in class.
- Exercises and primary source documents are assigned as homework and are discussed and reviewed in class
- Laboratory activities (including practical work and laboratory reports)
- Use of Blackboard course management system, through which instructors post course information, lecture notes, assignments, announcements, as well as additional resources; use of textbook online platforms that provide additional learning resources.
- Group work in class/labs or with the help of Blackboard interactive tools (Discussion Board, Blog, Journal, Groups).
- Office hours: students are encouraged to make full use of the office hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.

<b>ASSESSMENT:</b>	<p><b>Summative:</b></p> <table border="1" data-bbox="639 134 1382 291"> <tr> <td>Midterm examination (2 hours) (Multiple choice/short answers/essay questions)</td> <td><b>30%</b></td> </tr> <tr> <td>Final examination (2 hours) (Multiple choice/short answers/essay questions)</td> <td><b>45%</b></td> </tr> <tr> <td>Lab report(s)</td> <td><b>25%</b></td> </tr> </table> <p><b>Formative:</b></p> <table border="1" data-bbox="639 352 1382 449"> <tr> <td>Essay questions/problems (in-class or as homework assignments)</td> <td><b>0</b></td> </tr> <tr> <td>In-class or online quizzes</td> <td><b>0</b></td> </tr> </table> <p>The formative tests aim to prepare students for the examinations. Students are expected to submit feedback on their performance. The lab reports test learning outcomes 3 and 4. The midterm examination tests Learning Outcome 1, 2 and 3, focusing on the first part of the content. The final examination also tests Learning Outcomes 1, 2 and 3, focusing on the second part of the content.</p>	Midterm examination (2 hours) (Multiple choice/short answers/essay questions)	<b>30%</b>	Final examination (2 hours) (Multiple choice/short answers/essay questions)	<b>45%</b>	Lab report(s)	<b>25%</b>	Essay questions/problems (in-class or as homework assignments)	<b>0</b>	In-class or online quizzes	<b>0</b>
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In-class or online quizzes	<b>0</b>										
<b>INDICATIVE READING:</b>	<p><b>Required Reading:</b></p> <ul style="list-style-type: none"> <li>Malone, L. J. and Dolter, T. 2013. <i>Basic Concepts of Chemistry</i>, 9th Edition, Wiley</li> </ul> <p><b>Recommended Readings:</b></p> <ul style="list-style-type: none"> <li>Hein, M. and Arena, S. 2013. <i>Foundations of Chemistry</i>, 14th Edition, International Student Version</li> <li>Zumdahl, S.S., Zumdahl, S.A. and DeCoste, D.J. 2018. <i>Chemistry</i>, 10<sup>th</sup> edition, Cengage Learning.</li> </ul>										
<b>INDICATIVE MATERIAL:</b> (e.g. audiovisual, digital material, etc.)	<p><b>REQUIRED MATERIAL:</b> N/A</p> <p><b>RECOMMENDED MATERIAL:</b> N/A</p>										
<b>COMMUNICATION REQUIREMENTS:</b>	Verbal skills using academic/professional English										
<b>SOFTWARE REQUIREMENTS:</b>	Word, PowerPoint, Excel										
<b>WWW RESOURCES:</b>	<ul style="list-style-type: none"> <li>Scientific American: <a href="http://www.sciam.com">www.sciam.com</a></li> <li>American Chemical Society: <a href="http://www.acs.org/content/acs/en.html">http://www.acs.org/content/acs/en.html</a></li> <li>International Union of Pure and Applied Chemistry: <a href="https://iupac.org/">https://iupac.org/</a></li> <li>National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards: <a href="http://www.cdc.gov/niosh/npg/npg.html">http://www.cdc.gov/niosh/npg/npg.html</a></li> </ul>										
<b>INDICATIVE CONTENT:</b>	<ol style="list-style-type: none"> <li>Introduction       <ul style="list-style-type: none"> <li>Science and the Scientific method</li> <li>An Introduction to Chemistry</li> </ul> </li> <li>Measurements in Chemistry       <ul style="list-style-type: none"> <li>The Numbers Used in Chemistry</li> <li>The Measurements Used in Chemistry</li> </ul> </li> <li>Elements and Compounds       <ul style="list-style-type: none"> <li>The Elements and Their Composition</li> </ul> </li> </ol>										

- Compounds and Their Composition
- 4. The Properties of Matter and Energy
  - The Properties of Matter
  - Energy and Interaction with Matter
- 5. The Periodic Table of the Elements
  - Relationships Among the Elements and the Periodic Table
  - Formulas and Names of Compounds
- 6. Chemical Reactions
  - The Representation of Some Chemical Changes and Some Types of Changes
  - Examples of Chemical Reactions in Water
- 7. Quantitative Chemistry
  - Measurement of Mass of Elements and Compounds
  - Mass Relationships in Chemical Reactions
  - Energy Relationships in Chemical Reactions
- 8. Modern Atomic Theory
  - The Energy of the Electron in the Atom
  - The Periodic Table and Electron Configuration
- 9. The Chemical Bond
  - Ionic Bond and Ionic Compounds
  - Covalent Bonds and Molecular Compounds
  - Molecular Polarity and Molecular Shapes
- 10. The States of Matter
  - The Gaseous State
  - The Solid and Liquid States
- 11. Aqueous Solutions
- 12. Acids, Bases and Salts
- 13. Oxidation-Reduction Reactions
- 14. Nuclear Chemistry
  - Naturally Occurring Radioactivity
  - Induced Nuclear Changes and Their Uses
- 15. Organic Chemistry: An Overview

**LAB OUTLINE:**

Lab activities are performed in the laboratory.

Examples of topics may include, but are not limited to, the following:

- Introduction, Safety and Measurements in Science
- Physical Properties of Matter: Measurements of Mass, Volume, Density
- Chemical Properties of Matter: Chemical Reactions
- Mole and Mass Relationships in Chemical Equations
- Chemical Elements and their Properties
- Chemical Bonding and Molecular Shapes
- Properties of Gases, Liquids and Solutions
- Acids, Bases and Neutralization
- Redox Reactions
- Radioactivity and Nuclear Energy
- Organic Compounds: Structure and Properties