

DEREE COLLEGE SYLLABUS FOR:

SC 1000 LE SCIENCE AND EVERYDAY LIFE

3/1½/4

(Updated Summer 2016)

PREREQUISITES:

No prerequisites

CATALOG DESCRIPTION:

An introduction to physical and natural sciences with emphasis on fundamental scientific principles and their applications in everyday life. The course discusses Newton’s laws of motion, energy and the laws of thermodynamics, the nature of the atom and the chemical bond, nuclear science, the origins of the Universe, properties of stars and planets as well as environmental issues.

RATIONALE:

Science and Everyday Life is a science course with lab that is designed for students with little or no background in natural sciences. Its aim is to give students a better understanding of basic principles in different fields of physical and natural sciences and their applications in everyday life. Topics are seen from multiple perspectives (physics, chemistry, astronomy, but also history of science and implications for life and society). Emphasis is given on the understanding of concepts and not on problem solving. Knowledge gained in this course will help students develop a more critical way of thinking about new advances in science and technology in a rapidly changing and increasingly complex world.

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 physical sciences on the following topics: mechanics and Newton’s laws of motion, energy, laws of thermodynamics, properties of matter, atomic structure, chemical bonding, nuclear chemistry, the stars and the solar system.
 2. Relate specific topics in physical sciences to environmental, economic and socio-political issues at local and global level.
 3. Discuss and evaluate advances and applications of physical sciences in everyday life and in different scientific fields.
 4. Develop skills for using basic methods in physical and natural sciences, including the ability to acquire, process and evaluate data and to use appropriate laboratory and field equipment competently and safely.

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 and field activities (including practical work and laboratory reports).
 - Use of textbook web site, CD-ROMs and online resources.
 - 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.
 - Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

ASSESSMENT:

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| Summative: | |
| Midterm examination (2 hours) (Multiple choice/short answers/essay questions) | 30% |

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| | <table border="1" data-bbox="639 100 1380 197"> <tr> <td>Final examination (2 hours) (Multiple choice/short answers/essay questions)</td> <td>45%</td> </tr> <tr> <td>Lab report(s)</td> <td>25%</td> </tr> </table> <p>Formative:</p> <table border="1" data-bbox="639 260 1380 323"> <tr> <td>Essay questions (as homework assignments)</td> <td>0</td> </tr> <tr> <td>In-class or online quizzes</td> <td>0</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 Outcome 4. The midterm examination tests Learning Outcomes 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 on the content. The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. Students are not required to resit failed assessments in this module. Failure to pass the module results in module repeat.</p> | Final examination (2 hours) (Multiple choice/short answers/essay questions) | 45% | Lab report(s) | 25% | Essay questions (as homework assignments) | 0 | In-class or online quizzes | 0 |
| Final examination (2 hours) (Multiple choice/short answers/essay questions) | 45% | | | | | | | | |
| Lab report(s) | 25% | | | | | | | | |
| Essay questions (as homework assignments) | 0 | | | | | | | | |
| In-class or online quizzes | 0 | | | | | | | | |
| INDICATIVE READING: | <p>Required Reading:</p> <ul style="list-style-type: none"> Trefil J. and Hazen R.M. 2013. <i>The Sciences: An Integrated Approach</i>. John Wiley and Sons <p>Recommended Readings:</p> | | | | | | | | |
| INDICATIVE MATERIAL: (e.g. audiovisual, digital material, etc.) | <p>REQUIRED MATERIAL: N/A</p> <p>RECOMMENDED MATERIAL: N/A</p> | | | | | | | | |
| COMMUNICATION REQUIREMENTS: | Verbal skills using academic/professional English | | | | | | | | |
| SOFTWARE REQUIREMENTS: | Word, PowerPoint, Excel | | | | | | | | |
| WWW RESOURCES: | <ul style="list-style-type: none"> Scientific American: www.sciam.com New Scientist: www.newscientist.com | | | | | | | | |
| INDICATIVE CONTENT: | <ol style="list-style-type: none"> Introduction to Science <ul style="list-style-type: none"> The Importance of Natural Sciences Science and Technology The Scientific Method Major Achievements in Natural Sciences Today The Ordered Universe and Newton's Laws of Motion <ul style="list-style-type: none"> The Birth of Modern Astronomy The Birth of Mechanics Newton's Laws of Motion Energy and the Laws of Thermodynamics <ul style="list-style-type: none"> Forms of Energy Energy Conversions Conservation of Energy Energy for Life Energy for Today and Tomorrow Heat and the Second Law of Thermodynamics <ul style="list-style-type: none"> Heat and Temperature | | | | | | | | |

- Entropy and the Second Law of Thermodynamics
- 5. Waves and Electromagnetic Energy
 - Properties of Waves
 - Electromagnetic Waves
 - Applications of Electromagnetic Radiation
- 6. The Atom
 - The Structure of the Atom
 - The Periodic Table of the Elements
 - Elements Essential for Life
- 7. How Atoms Combine – The Chemistry in Our Lives
 - Ionic Bonds
 - Covalent Bonds
 - Metallic Bonds
 - Intermolecular Forces and States of Matter
 - Gases
 - Gases and Life: The Atmosphere
 - Liquids and Solids
 - Changes of State
 - Liquids and Life: Water
- 8. The Atomic Nucleus and Its Power
 - Radioactivity
 - Nuclear Medicine and Other Applications of Radioactivity
 - Nuclear Fission and Fusion
 - Nuclear Power Today
- 9. Stars and Cosmology
 - Stars and Galaxies
 - The Origins of the Universe and of Matter
- 10. The Earth and Other Planets
 - Formation of the Earth and Other Planets
 - Evolution of the Atmosphere of the Earth
 - Composition and Structure of the Earth and Other Planets

LAB OUTLINE (INDICATIVE TOPICS):

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

- Measurements in Science: Mass, Volume and Density
- Gravity and Newton's Laws
- Heat, Temperature and Specific Heat
- Interaction between Electromagnetic Radiation and Matter
- Chemical Elements and the Periodic Table
- Molecular Shapes
- Gases (Properties) – Atmosphere
- Properties of Liquids and Solutions
- The Atomic Nucleus and its Power
- The Solar System (Exploration through the Internet)