The Hong Kong Polytechnic University

Subject Description Form

Subject Code	FS1001
Subject Title	Fundamentals of Modern Science
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject aims to provide an integrated introduction to the fundamental concepts of modern science, encompassing essential elements from biology, chemistry, physics, and food science. The course is designed to foster an appreciation of the interconnectedness of scientific disciplines and their applications in everyday life and technology.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Understand and apply core concepts from biology, chemistry, physics, and food science. (b) Appreciate the role of scientific principles in technological advancements and daily life. (c) Develop critical thinking and problem-solving skills through interdisciplinary scientific inquiry.
Subject Synopsis/ Indicative Syllabus	**Fundamental Chemistry Concepts** • Introduction to Chemistry • Atomic Structure, Bonding, and State of Matter • Chemical Reactions • Introduction to Acids and Bases **Principles of Physics** • Introduction to Physics • Motion, Forces, and Energy • Electricity • Discussion of selected physics topics (e.g., Heat and Temperature; Waves and Sound; Light and Optics; Quantum physics; Relativity) **Introduction to Life and Biological Sciences** • Basics of biochemistry and molecular biology

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- The organization and functions of complex biological organisms
- Modern biotechnology

Basics of Food Science and Nutrition

- Food Production, processing, quality, and safety
- Basic Components of Foods and Their Functions
- Role of food components in the human body

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<tr><td></td><td>The course will employ a combination of lectures, tutorials, and flipped learning. Lectures will introduce core concepts, while tutorials will focus on problem-solving and application. Flipped learning will encourage students to explore additional content independently, fostering self-directed learning and deeper understanding.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Continuous assessment</td><td>60%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final exam</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="3"></td></tr>
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Continuous assessment includes, but not limited to, in-class assessments, short quizzes, flipped-class assignments.

The final exam is a comprehensive assessment that evaluates students' overall understanding of the course material. It tests their ability to apply scientific concepts and problem-solving skills across different domains.
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<tr><td>Student Study Effort Expected</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorials</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study and flipped learning</td><td>84 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>123 Hrs.</td></tr>
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Reading List and References	Tro, N. J., (2018) *Introductory Chemistry Essentials,* Pearson. Hewitt, P. G., (2022) *Conceptual physics* (13th edition), Harlow: Pearson. Muller, R. (Richard), (2012) *Energy for future presidents: the science behind the headlines* (1st edition), New York: W.W. Norton. Eric J. Simon, Jean L. Dickey, Jane B. Reece, (2019) *Campbell Essential Biology with Physiology* (5th edition), Pearson. Parker R. O. and Pace M., (2017) *Introduction to food science & food systems* (2nd edition), Boston, MA: Cengage Learning. Richman S. and Ortiz D., (2016) *Nutrition* (1st edition), Ipswich, Massachusetts: Salem Press; Amenia, NY: Grey House Publishing.