City University of Hong Kong

Information on a Gateway Education Course
offered by Department of Mechanical and Biomedical Engineering
with effect from Semester A in 2014 / 2015

Part I

Course Title:  Science and Technology: From Past to Future
Course Code:   GE2301
Course Duration:  One Semester

Proposed Area: (Please insert “1” for the single primary area, and ‘2” for the secondary area if applicable. Students will only earn credit units from the primary area.)

☐ Arts and Humanities
☐ Study of Societies, Social and Business Organisations
☑ Science and Technology

No. of Credit Units:  3
Level:  B2
Medium of Instruction:  English
Medium of Assessment:  English
Prerequisites:  Nil
Precursoers:  Nil
Equivalent Courses:  Nil
Exclusive Courses:  Nil
Part II

1. Abstract

Science and technology is not only an essential part of human civilisation. They are also important for transforming business based on labour-intensive, low value-added activities to knowledge-intensive, high value-added activities. The continued success of business often depends on making creative and effective use of science and technology. Graduates will have many opportunities to work with science and technology establishments in their professional capacities as business executives, public administrators, legal practitioners, mass media professionals, etc. This course will help the students to understand the importance of technology and applied sciences in different aspects of our society from the past to the present through lectures, seminars and industrial visits. This course also intends to help the students to develop an appreciation for scientific inquiry and critical reasoning through group discussions and group projects; these basic skills are useful for students’ career development in different disciplines.

2. Course Aims

This course aims to help students recognize the profound importance of technology and applied sciences in different aspects of our society from the past to the present and beyond. By explaining the basic methodologies and techniques of inquiry of scientists and engineering professionals, this integrative course also intends to help students to develop an appreciation for scientific inquiry and basic skills such as critical reasoning.

3. Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

<table>
<thead>
<tr>
<th>No.</th>
<th>CILOs</th>
<th>Weighting</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Identify the principles of scientific methodology / reasoning as they are applied to solving everyday problems</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Evaluate alternative methods / solutions comprehensively, using a wide array of criteria such as technological attributes, finances, ethics, impacts on the environment and etc</td>
<td>3</td>
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<td>3.</td>
<td>Analyze the relationships between science and technology and society as well as how they affect socio-economic developments</td>
<td>3</td>
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<tr>
<td>4.</td>
<td>Apply teamwork skills in collaborative learning settings</td>
<td>1</td>
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4. Teaching and Learning Activities (TLAs)

<table>
<thead>
<tr>
<th>TLA</th>
<th>CILO No.</th>
<th>Hours/week (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large class activities¹</td>
<td>1, 2, 3</td>
<td>13 hrs (total)</td>
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<tr>
<td>Small class activities²</td>
<td>1, 2, 3, 4</td>
<td>16 hrs (total)</td>
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<tr>
<td>Field trips/ Industrial visits etc.³</td>
<td>1, 2, 3</td>
<td>10 hrs (total)</td>
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1. Large class activities consist of lectures and laboratory visits
2. Small class activities consist of group project meeting.
3. Field trip will visit one/two local industries, such as those located in the Science Park.

5. Assessment Tasks/Activities

Assessment is 100% by coursework:

a. Individual assignment – Integrated Case Study (40%)

b. Group Project (60%)

<table>
<thead>
<tr>
<th>Assessment Tasks/Activities</th>
<th>CILO No.</th>
<th>Weighting</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Integrative Case Study (40%) and Discipline-specific Group Project (60%)*</td>
<td>1</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>30%</td>
<td></td>
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<tr>
<td></td>
<td>4</td>
<td>15%</td>
<td>Upon completing the group project, students will conduct peer assessment</td>
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6. **Grading of Student Achievement:**

There will be no final exam for this course. Students will be evaluated on a continuous basis. Student performance will be graded using the assignments mentioned in Section 5 Assessment Tasks/Activities:

(1) The integrative case study, an individual assignment accounting for 40% of each student’s course grade, should demonstrate the student’s ability to identify and explain the fundamental concepts discussed as well as the reasoning underlying these concepts and apply these concepts in an integrative manner.

(2) The discipline-specific group project makes up 60% of the overall course assessment. The group project report should demonstrate the students’ groupwork ability to complete a task which requires

- drawing conclusions based on valid evidence or proof
- using process(es) of scientific reasoning appropriate for the selected subject area(s)
- using scientific results to reach appropriate conclusions

(3) Continuous assessment. The performance of the students in the above activities will be monitored and recorded to form the basis of continuous assessment.

**Grade descriptions**

**Grade A**
The student completes all assessment tasks/activities and the work demonstrates excellent synthesis of various scientific principles as they are applied to solving everyday problems. He/she evaluates alternative solutions comprehensively, using a wide array of criteria such as technological attributes, finances, ethics, and impacts on the environment. He/she thoroughly analyzes how science and technology affect socio-economic developments. The student’s work provides strong evidence of original thinking, supported by a variety of properly documented information sources other than taught materials. He/she is able to communicate ideas in an effective and engaging manner. The student participates in the learning process actively and productivity, as reflected by his/her classwork. Peer evaluation indicates that the student actively contributes to the team’s collaborative learning experience.
**Grade B**
The student completes all assessment tasks/activities and can describe and explain various scientific principles as they are applied to solving everyday problems. He/she provides a detailed evaluation of alternative solutions, using a wide array of criteria such as technological attributes, finances, ethics, and impacts on the environment. He/she competently analyzes how science and technology affect socio-economic developments. He/she demonstrates an ability to integrate taught concepts, analytical techniques and applications via clear oral and written communication. The student makes good efforts to learn in class activities. Peer evaluation indicates that the student contributes to the team’s collaborative learning experience.

**Grade C**
The student completes all assessment tasks/activities and can describe and explain some scientific principles as they are applied to solving everyday problems. He/she provides simple but accurate evaluation of alternative solutions, using some of the following criteria such as technological attributes, finances, ethics, and impacts on the environment. He/she analyzes some aspects of how science and technology affect socio-economic developments. He/she can communicate ideas clearly in written texts and in oral presentations. The student makes some efforts in class activities, but the performance is inconsistent. Peer evaluation indicates that the student participates in collaborative learning activities.

**Grade D**
The student completes all assessment tasks/activities but can only briefly describe some scientific principles as they are applied to solving everyday problems. He/she demonstrates limited ability in evaluating alternative solutions objectively or systematically. The analysis on how science and technology affect socio-economic developments is done in a partial manner. He/she can communicate simple ideas in writing and orally. The student rarely takes part in class activities. Peer evaluation indicates that the student only participates in collaborative learning activities in an inconsistent manner.

**Grade F**
The student fails to complete all assessment tasks/activities and/or cannot accurately describe and explain relevant scientific principles as they are applied to solving everyday problems. He/she fails to evaluate alternative solutions objectively or systematically. He/she cannot analyze or identify how science and technology affect socio-economic developments. The ability to communicate ideas is weak and/or the student’s work shows evidence of plagiarism. The student does not take part in most of the class activities. Peer evaluation indicates that the student fails to participate in collaborative learning activities.
Part III

Keyword Syllabus:

- History of Technology Development and Its Impacts on Human Civilization
  - technological achievements in ancient China
  - comparisons of the science and technology development in China and other countries
- Discipline specific topics –
  - Physical Sciences
  - Life and Chemical Sciences
  - Electrical and Electronic Technology
  - Computer and Information Technology
- Technological and Socio-economic Development and Sustainability

Recommended Reading:

Text(s):

Online Resources:

BBC News (Science & Nature)
• http://news.bbc.co.uk/2/hi/science/nature/default.stm

New York Times
• Technology Page http://www.nytimes.com/pages/technology/index.html

CNN / Technology
• http://edition.cnn.com/TECH/