City University of Hong Kong

Information on a Course
offered by Department of Biology and Chemistry
with effect from 2014/2015

Part I

Course Title: Discovery in Biology
Course Code: BCH1200
Course Duration: One Semester
No. of Credit Units: Three
Level: B1
Prerequisites: (Course Code and Title) Nil
Precursors: (Course Code and Title) Nil
Equivalent Courses: (Course Code and Title) Nil
Exclusive Courses: (Course Code and Title) Nil

Part II

1. Course Aims:

After a century in which physical sciences and engineering have dominated public attention, many of the most challenging issues in the 21st century are likely to be related to biology: dealing with emergent diseases, feeding the increasing world population, generating energy from biological sources, creating a better environment for sustainable growth. Biology is on the verge of answering some of the most fundamental questions of our existence: How do organisms grow and develop? To what extent can and should we manipulate biology for our purposes?

This course aims to equip students with little or no biological background with basic biological concepts needed to navigate in a world where biological knowledge is becoming increasingly essential for a global citizen. In this course, students will be
guided to explore the intricacy and complexity of organisms and integrate this knowledge into the world around them.

The course will begin with an examination of the chemical basis of life, then move on to systems of increasing complexity, from genes to cells to ecosystems. At all times, the course will connect students to issues of human interest, examining social, ethical and environmental issues relevant to biology in the 21st century. The central theme is to apply biological concepts to familiar experiences and to help students share the excitement of science and its importance to their daily lives.

2. Course Intended Learning Outcomes (CILOs)
*(state what the student is expected to be able to do at the end of the course according to a given standard of performance)*

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

- Explain basic concepts of biology governing the diversity and complexity of life.
- Apply basic biological concepts to discover and analyze the reasons behind local / regional / global issues in relation to daily life.
- Examine and discover the roles of biology in society both today and in the future.

3. Teaching and learning Activities (TLAs)
*(designed to facilitate students’ achievement of the CILOs)*

3.1 Course structure

This course is taught in eight modules, each dealing with one theme of life sciences (see below for the themes). Through these eight themes, students will be encouraged to appreciate the scope and objectives of modern biology. Students are guided to apply facts to problem-solving and to learn research skills such as data analysis, writing, and working in teams.

Lectures will contain information essential for problem-solving questions with guiding questions and discussion ideas prepared by our faculty. In some modules, students will be given online research exercises, including analysis of publicly available databases, and literature search and review. In other modules, field investigations and laboratory sessions will be conducted. For some modules, students will be divided into small groups and participate in a one-hour tutorial on a case study with a faculty member. The questions arising from each case study will be discussed, based on the knowledge and ideas that students have learned in the lecture, personal reading and online assignments.

3.2 Use of technology

This course is based on an Active Learning Framework (ALF) which contains multiple teaching activities connected by Blackboard. These activities, and the active learning components and use of technology in each activity, are summarized in the Table below.
Activities in Active Learning Framework (ALF)
[DEC = Discovery of relevant information needed to solve problems/design new solutions]

<table>
<thead>
<tr>
<th>Activities</th>
<th>Active Learning Component</th>
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| Lectures            | - Active listening  
                       | - Quizzes  
                       | • Questions designed to assess knowledge (application of knowledge and critical thinking)                                                                 |
| *Labs               | Students working in small groups to discover how standard procedures can explain lecture-related concepts and problems.                                     |
| *Field Trip         | Out-of-classroom learning experience – observation/data collection/processing and analysis of information leading to discovery of natural ecological processes / biodiversity new to students / presentation. |
| Online review quizzes | A question bank will be available to students to self-assess learning of lecture/lab/field trip concepts. Numerous attempts allowed.                      |
| Open online discussion | Students are recommended to enter the common discussion area in collaboration to ask questions, share their discoveries and respond to peers’ postings.       |
| Feedback to students: grade posting | Students may access online Grade Book to review marks/grades that are updated on a regular basis.                                                       |
| Course evaluation   | Mid/End of semester evaluation/feedback.                                                                                                                    |

*Particular attention will be given to these discovery-based teaching and learning activities which are specifically designed to foster and nurture an attitude of curiosity/discovery in students and will be assessed in this course.

3.2.1 Lectures

All lecture slides and notes will be available on Blackboard, as well as a number of guiding questions. These questions serve as guidelines for students to read about the topics introduced in the lectures. Sections selected from a recommended textbook will be used.

4. Assessment Tasks/Activities  
(designed to assess how well the students achieve the CILOs)

As no end-of-the-course examination is planned for this course, most of the teaching and learning activities are formative assessment tasks to help students build capacity to develop the skills as stated in the Course Learning Outcomes. Although most of these tasks will be undertaken on a group basis, assessment of each student’s performance can be made through a coached peer-assessment exercise.

For example, to assess students’ ability to explain basic biological concepts, the in-class real time assessment using multiple-choice questions after a short lecture (e.g., Microbiology) or video show for topics such as The Chemistry of Life using a mobile device (the ‘clicker’ idea) is one method that will be used. Each student can be assessed
individually with these tasks.

The "tutorial" activities linked with each topic take different forms. Some are field investigations associated with topics such as Evolution and Biodiversity when students will be working in groups to make field observations and related investigations to answer key questions related to the interaction between life forms, the environment and human affairs. Students will also be given web-based assignments to search the web for information on the topic DNA and Forensic Science and given case studies to solve DNA forensics problems in groups. Assessment will be based on the investigation outcomes in a project presentation evaluated both by their peers and the staff involved. Each student’s performance, their contributions to the field/web investigation outcomes and teamwork participation will also be evaluated through peer evaluation. These activities are designed to connect students to issues of interest relevant to their being as "humans" and at the same time help them to develop outcomes associated with CILOs 2 and 3, namely to analyze reasons behind local / regional / global issues in relation to daily life and examine and reflect the roles of biology in today’s and tomorrow’s society.

5. Grading of Student Achievement: Refer to Grading of Courses in the Academic Regulations (Attachment) and to the Explanatory Notes.

Starting from Semester B, 2002-03, undergraduate students must satisfy the following minimum passing requirements for BCH courses:
"A minimum of 30% in coursework as well as examination, in addition to a minimum of 40% in coursework and examination taken together".

Grading will be based on students’ performance in assessment tasks and activities. Allocation of marks will be as shown in the following Table. Coursework constitutes 100%.

Assessment

<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Lecture-related Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Lab exercises</td>
<td>30%</td>
</tr>
<tr>
<td>Field Trip</td>
<td>15%</td>
</tr>
<tr>
<td>&quot;Assessed Tutorials&quot; on two thematic areas:</td>
<td></td>
</tr>
<tr>
<td>- Microbiology</td>
<td>10%</td>
</tr>
<tr>
<td>- A Brave New World</td>
<td>10%</td>
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<tr>
<td>Participation in online E-learning system</td>
<td>5%</td>
</tr>
<tr>
<td>Grade</td>
<td>Attributes</td>
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<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>A</td>
<td>Students can explain all basic concepts of biology governing the diversity and complexity of life in a very comprehensive manner both in written and oral format. They can expertly apply basic biological concepts to analyze all-inclusive reasons behind local / regional / global issues in relation to daily life. Their oral / written submissions demonstrate that they have undertaken an in-depth and critical examination and reflection upon the roles of biology in today’s and tomorrow’s society. All assignments are completed on time.</td>
</tr>
<tr>
<td>B</td>
<td>Students can explain most basic concepts of biology governing the diversity and complexity of life in a comprehensive manner both in written and oral format. They can competently apply basic biological concepts to analyze most of the reasons behind local / regional / global issues in relation to daily life. Their oral / written submissions demonstrate that they have undertaken a partially in-depth and critical examination and reflection upon the roles of biology in today’s and tomorrow’s society. All assignments are completed on time.</td>
</tr>
<tr>
<td>C</td>
<td>Students can explain some basic concepts of biology governing diversity and complexity of life in a comprehensive manner both in written and oral format. They can partially apply basic biological concepts to analyze some of the reasons behind local / regional / global issues in relation to daily life. Their oral / written submissions demonstrate that they have taken a non-critical approach to examine and reflect upon the roles of biology in today’s and tomorrow’s society. All assignments are completed on time.</td>
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<tr>
<td>D</td>
<td>Students can explain only a few basic concepts of biology governing diversity and complexity of life in a comprehensive manner both in written and oral format. They can occasionally apply basic biological concepts to analyze a few of the reasons behind local / regional / global issues in relation to daily life. Their oral / written submissions demonstrate that they have taken a superficial approach to examine and reflect upon the roles of biology in today’s and tomorrow’s society. All assignments are completed on time.</td>
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<tr>
<td>F</td>
<td>Students fail to explain most basic concepts of biology governing diversity and complexity of life in a comprehensive manner both in written and oral format. They fail to apply basic biological concepts to analyze the reasons behind local / regional / global issues in relation to daily life. Their oral / written submissions demonstrate that they have failed to examine and reflect upon the roles of biology in today’s and tomorrow’s society. Some of the assignments are not completed on time.</td>
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**Part III**

**Keyword Syllabus**
- Microbiology
- The Chemistry of Life
- The Biology of Cells
- Genetics
- Evolution and Biodiversity
- Plant Evolution and Diversity
- Animal Physiology
- A Brave New World
Recommended Reading
Text(s)

Online Resources
“Aplia: engage prepare educate”, Cengage Learning, web site: https://www.aplia.com

Teaching plan

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introductory lecture to the course</td>
</tr>
<tr>
<td>2</td>
<td>Microbiology</td>
</tr>
<tr>
<td>3</td>
<td>Chemistry of Life (Biochemistry)</td>
</tr>
<tr>
<td>4</td>
<td>Biology of Cells (Cell Biology)</td>
</tr>
<tr>
<td>5</td>
<td>Genetics</td>
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<tr>
<td>6</td>
<td>Evolution</td>
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<tr>
<td>7</td>
<td>Biodiversity</td>
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<tr>
<td>4-8</td>
<td>Lab Session</td>
</tr>
<tr>
<td>8</td>
<td>Plants: Evolution, Diversity, Adaptation and Structure</td>
</tr>
<tr>
<td>9</td>
<td>Animal Physiology</td>
</tr>
<tr>
<td>8-10</td>
<td>Field Trip</td>
</tr>
<tr>
<td>10</td>
<td>A Brave New World</td>
</tr>
</tbody>
</table>

Teaching pattern (and pedagogical framework):

Duration of course:

Suggested lecture/tutorial/laboratory mix:

Lectures 22 h
Tutorials 12 h
Laboratory 6 h
Field trips 3 h
Pedagogical Framework

Lectures (22 hrs)

Labs (6 hrs)
- Genetics
- Microbiology

Discovery in Biology
(8 Modules)

Field Trip (3 hrs)
- Evolution & Biodiversity

Tutorials (12 hrs)

Mentor-based Tutorials (no credit)
- Meeting students for 1 hour in alternate weeks during the semester (6 hrs in total)

Assessed Tutorials (2)
TLAs designed by
- Task Team 1 (Microbiology) (2hrs)
- Task Team 2 (A Brave New World) (2hrs)

Returned by

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