City University of Hong Kong
Course Syllabus
offered by Department of Computer Science
with effect from Semester A 2022/23

Part I Course Overview

Course Title: Computer Systems

Course Code: CS2116

Course Duration: One Semester

Credit Units: 3 credits

Level: B2

Proposed Area: (for GE courses only)
- Arts and Humanities
- Study of Societies, Social and Business Organisations
- Science and Technology

Medium of Instruction: English

Medium of Assessment: English

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 Course Details

1. Abstract
   (A 150-word description about the course)

   This course aims to introduce the logic design techniques in the construction of the functional parts of a CPU and fundamental components and principles of operation of computer systems.

2. Course Intended Learning Outcomes (CILOs)
   (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.)

<table>
<thead>
<tr>
<th>No.</th>
<th>CILOs*</th>
<th>Weighting* (if applicable)</th>
<th>Discovery-enriched curriculum related learning outcomes (please tick where appropriate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Describe functions of the basic building blocks of a digital system.</td>
<td></td>
<td>A1 ✓ A2 A3</td>
</tr>
<tr>
<td>2.</td>
<td>Make critique and assessment on various architectures and the design concepts for analyzing computer systems.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3.</td>
<td>Explore the basic operations of cache and main memory, I/O operations, bus, interrupt and peripheral devices as well as assessing the performance of different designs.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Write low-level programs for bitwise operation, function pointer, call-back function, and event interrupt using C or C++ language.</td>
<td></td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

* If weighting is assigned to CILOs, they should add up to 100%.

* Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
   Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
   Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments
   Demonstrate accomplishment of discovery/innovation/creativity through producing/constructing creative works/new artefacts, effective solutions to real-life problems or new processes.
3. **Teaching and Learning Activities (TLAs)**

*(TLAs designed to facilitate students’ achievement of the CILOs.)*

<table>
<thead>
<tr>
<th>TLA</th>
<th>Brief Description</th>
<th>CILO No.</th>
<th>Hours/week (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Introduce the logic design techniques in the construction of the functional parts of a CPU and fundamental components and principles of operation of computer systems.</td>
<td>✓ ✓ ✓ ✓</td>
<td>3 hours/week</td>
</tr>
<tr>
<td>Tutorial</td>
<td>Students will be provided with some exercise questions to gain better understanding of the lecture materials. The instructor will explain the questions in detail.</td>
<td>✓ ✓ ✓ ✓</td>
<td>8 hours/semester</td>
</tr>
<tr>
<td>Assignment</td>
<td>Assignments will be given out during the semester. Assignments will be focusing on practical questions.</td>
<td>✓ ✓ ✓ ✓</td>
<td>After class</td>
</tr>
</tbody>
</table>

4. **Assessment Tasks/Activities (ATs)**

*(ATs are designed to assess how well the students achieve the CILOs.)*

<table>
<thead>
<tr>
<th>Assessment Tasks/Activities</th>
<th>CILO No.</th>
<th>Weighting*</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Assessment: 30%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment</td>
<td>✓ ✓ ✓ ✓</td>
<td>10%</td>
<td>It includes short factual questions and case studies regarding computer architecture. Quality of assignment (correctness of answers and ability to apply knowledge) will be used to assess CILOs.</td>
</tr>
<tr>
<td>Lab Project</td>
<td>✓</td>
<td>5%</td>
<td>There will be three tutorials devoted to Arduino board experiments where the student need to upload their program to the Arduino board to fulfil some functionality. In total, there are three mini projects to complete.</td>
</tr>
<tr>
<td>Exam/quiz</td>
<td>✓ ✓ ✓ ✓</td>
<td>70%/15%</td>
<td>Final exam and quiz will include questions assessing the students’ understanding on architectural aspect of computer.</td>
</tr>
</tbody>
</table>

*The weightings should add up to 100%.

\[^]{For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.}
5. **Assessment Rubrics**

*(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)*

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Criterion</th>
<th>Excellent (A+, A, A-)</th>
<th>Good (B+, B, B-)</th>
<th>Fair (C+, C, C-)</th>
<th>Marginal (D)</th>
<th>Failure (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment</td>
<td>ABILITY to SOLVE questions from different basic topics</td>
<td>High</td>
<td>Significant</td>
<td>Moderate</td>
<td>Basic</td>
<td>Not even reaching marginal levels</td>
</tr>
<tr>
<td>2. Lab Project</td>
<td>ABILITY to write the right code to make the Arduino board work appropriately</td>
<td>High</td>
<td>Significant</td>
<td>Moderate</td>
<td>Basic</td>
<td>Not even reaching marginal levels</td>
</tr>
<tr>
<td>3. Final Exam/Quiz</td>
<td>ABILITY to solve problems for different topics under time pressure</td>
<td>High</td>
<td>Significant</td>
<td>Moderate</td>
<td>Basic</td>
<td>Not even reaching marginal levels</td>
</tr>
</tbody>
</table>
Part III  Other Information (more details can be provided separately in the teaching plan)

1.  Keyword Syllabus
   (An indication of the key topics of the course.)


   Syllabus

   1.  Number systems
       Number representation. Binary arithmetic. Negative numbers. Floating point numbers and calculations, IEEE floating point.

   2.  Digital logic fundamentals
       Logic gates. Basic combinational circuits. Examples with applications.

   3.  Basic computer organization
       Functional subsystems: CPU, memory, input/output systems.

   4.  CPU organization and operations
       Register model. Fetch and execute cycle. Instruction format. Control unit and microprogramming, case study on a typical microprocessor.

   5.  Low-level programming

   6.  Memory system
       RAM, ROM. Cache memory. Flash memory.

   7.  Peripherals
       Display technology. Interactive Display. Storage device.

   8.  I/O and bus system
       Basic model of an I/O system. I/O interfaces including serial and parallel. PCI bus.

2.  Reading List

   2.1  Compulsory Readings
   (Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)


   2.2  Additional Readings
   (Additional references for students to learn to expand their knowledge about the subject.)


Course Syllabus
Jun 2017