Subject Description Form

Subject Code	EIE2105 (for 42477)
Subject Title	Digital and Computer Systems
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	To provide students with the foundation knowledge in digital systems and the organization and architecture of a computer
Intended Subject Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. Understand the fundamentals of digital systems and associated technologies; 2. Understand the architecture and organization of microprocessors; 3. Understand the functions and features of components in a computer.
Subject Synopsis/ Indicative Syllabus	**Syllabus:** 1. Number Systems, Operations, and Codes Binary, octal and hexadecimal numbers; base conversions 1's complement, 2's complement and binary arithmetic Binary-coded-decimal (BCD) representation Floating-point numbers 2. The Basics of Logic Design Gates, truth tables, and logic equations Combinational logic Constructing a basic arithmetic logic unit Sequential logic: Clocks, Counters, Flip-flops, latches, and registers Programmable Logic (PAL, PLA, FPGAs) 3. Microprocessor Design Basics Basic organization of a microprocessor Building a simple datapath The control unit Example: x86 microprocessor organization 4. Instruction Set Architecture Basic computer operation cycle Register set Operand addressing Addressing modes Types of instructions Example: x86 instruction set architecture 5. Introduction to Computer Systems Internal organization of computers Working principle of computer systems Types of computer systems Buses and memories Measurement of computer performance

Teaching/ Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures	1, 2, 3	Fundamental principles and key concepts of the subject are delivered to students.
Tutorials	1, 2, 3	Supplementary to lectures are conducted with smaller class size. The students will be able to clarify concepts and to have a better understanding of the lecture material. Some exercises and application examples are given for discussion.
Assignments	1, 2, 3	Through working assignment and end-of-chapter problems in text books, students will develop a firm understanding and comprehension of the knowledge taught.
Laboratory sessions	1, 2, 3	Students will make use of the software and hardware tools to develop simple digital systems and perform simulations.

Alignment of Assessment and Intended Subject Learning Outcomes

Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)		
		1	2	3
1. Continuous Assessment (total 50%)				
• Assignments	16%	✓	✓	✓
• Class Exercises	4%	✓	✓	✓
• Tests	20%	✓	✓	✓
• Laboratory Exercises	10%	✓	✓	
2. Examination	50%			
Total	100%			

The continuous assessment will consist of assignments, class exercises, tests and laboratory exercises.

<table>
<tr><td></td><td colspan="2">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

<table>
<tr><th>Specific Assessment Methods/Tasks</th><th>Remark</th></tr>
<tr><td>Assignments, class exercises and tests</td><td>End-of chapter type problems are used to evaluate students' ability in applying concepts and skills learned in class. Larger individual assignments will bet set in order to challenge students to apply the course contents in a more realistic setting.

Students are needed to think critically and creatively in order to come with an alternate solution for an existing problem.</td></tr>
<tr><td>Laboratory exercises</td><td>Each student is required to answer several questions related to each lab session in the lab sheet and hand in his/her answers.</td></tr>
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<tr><td rowspan="6">Student Study Effort Required</td><td>Class contact (time-tabled):</td><td></td></tr>
<tr><td>• Lecture</td><td>24 Hours</td></tr>
<tr><td>• Tutorial/Laboratory/Practice Classes</td><td>15 Hours</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination</td><td>36 Hours</td></tr>
<tr><td>• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing</td><td>30 Hours</td></tr>
<tr><td>Total student study effort:</td><td>105 Hours</td></tr>
<tr><td>Reading List and References</td><td colspan="2">Textbooks:

1. M.M. Mano and C.R. Kime, Logic and Computer Design Fundamentals, 4th ed., Upper Saddle River, NJ: Prentice-Hall, 2008.

Reference Books:

1. M. Rafiquzzaman, Fundamentals of Digital Logic and Microcomputer Design, 5th ed., John Wiley & Sons, 2005.
2. B. Brey, The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor: Architecture, Programming and Interfacing, 7th ed., 2005.
3. D.A. Patterson and J.L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 4th ed., Morgan Kaumann Publishers, 2009.</td></tr>
<tr><td>Last Updated</td><td colspan="2">April 2022</td></tr>
<tr><td>Prepared by</td><td colspan="2">Dr Lawrence Cheung</td></tr>
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