# Subject Description Form

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| **Subject Code** | EIE2261 |
| **Subject Title** | Logic Design |
| **Credit Value** | 3 |
| **Level** | 2 |
| **Pre-requisite/ Co-requisite/ Exclusion** | Nil |
| **Objectives** | To provide students with a broad view in digital logic design and enable them to gain understanding and skills that will be used in later computer-related courses. |
| **Intended Subject Learning Outcomes** | **Upon completion of the subject, students will be able to:**<br><br>Category A: Professional/academic knowledge and skills<br>1. Understand the fundamentals of digital systems and associated technologies.<br>2. Analyse and design simple systems related to digital logic.<br>3. Apply logic design techniques to construct digital systems with programmable logic devices and microprocessors, and appreciate the use of them.<br>4. Appreciate the importance of creativity and critical thinking on finding "good" solutions or making "good" designs.<br><br>Category B: Attributes for all-roundedness<br>5. Think critically. |
| **Subject Synopsis/ Indicative Syllabus** | **Syllabus:**<br><br>1. Logic Circuit and ICs<br>1.1 Decoders and encoders<br>1.2 Multiplexers and demultiplexers<br>1.3 Binary adders, binary adder-subtractors<br>1.4 Binary multipliers<br>1.5 Sequential circuit analysis and design<br>1.6 Registers and counters<br>1.7 HDL representation.<br><br>2. Memory and Programmable Logic Devices<br>2.1 RAM: Write and read operations, timing waveforms, RAM integrated circuits, three-state buffers, DRAM ICs<br>2.2 Programmable logic technologies<br>2.3 ROM, PLA and PAL<br>2.4 VLSI programmable logic devices: Xilinx FPGA.<br><br>3. Microprocessor<br>3.1 Register transfer operations<br>3.2 Microoperations<br>3.3 Bus-based transfer<br>3.4 ALU<br>3.5 Shifter<br>3.6 Datapath representation<br>3.7 Control word<br>3.8 Control unit<br>3.9 Hardwired control<br>3.10 Basic Assembly Language Programming. |

**Laboratory Experiment:**

1. Basic logic gates and their applications
2. Hardware description language and programmable logic devices

**Teaching/ Learning Methodology**

| Teaching and Learning Method | Intended Subject Learning Outcome | Remarks |
|---|---|---|
| Lectures | 1, 2, 3, 4 | Fundamental principles and key concepts of the subject are delivered to students. |
| Tutorials | 1, 2, 3, 4, 5 | Supplementary to lectures and are conducted with smaller class size.<br>Students will be able to clarify concepts and to have a deeper understanding of the lecture materials.<br>Problems and application examples are given and discussed. |
| Laboratory sessions | 1, 2, 3, 4, 5 | students will make use of the software and hardware tools to develop simple digital systems, perform simulations |

**Assessment Methods in Alignment with Intended Subject Learning Outcomes**

| Specific Assessment Methods/Tasks | % Weighting | Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate) | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1. Continuous Assessment (40%) | | | | | | |
| • Assignments | 10% | ✓ | ✓ | ✓ | ✓ | ✓ |
| • Tests | 20% | ✓ | ✓ | ✓ | ✓ | |
| • Laboratory sessions | 20% | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2. Examination | 50% | ✓ | ✓ | ✓ | ✓ | ✓ |
| Total | 100% | | | | | |

**Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:**

| Specific Assessment Methods/Tasks | Remark |
|---|---|
| Assignments | Enhance the understanding of the taught materials in the lectures. |
| Tests and examination | End-of chapter type problems are used frequently to evaluate students' ability in applying concepts and skills learned in class.<br>The students are also needed to think critically and creatively in the process of solving problems. |
| Laboratory sessions | Each student is required to do a demonstration and submit a lab report after the laboratory. |

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| **Student Study Effort Expected** | **Class contact (time-tabled):** | |
| | • Lecture | 24 Hours |
| | • Tutorial/Laboratory/Practice Classes | 15 hours |
| | **Other student study effort:** | |
| | • Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination | 36 Hours |
| | • Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing | 30 Hours |
| | **Total student study effort:** | **105 Hours** |
| **Reading List and References** | **Textbooks:**<br><br>1. M.M. Mano and C.R. Kime, *Logic and Computer Design Fundamentals*, 5th ed., Boston : Pearson, 2016.<br>2. A. B. Marcovitz, *Introduction to Logic Design*, 3rd ed., New York : McGraw-Hill 2010.<br><br>**Reference Books:**<br><br>1. M.M. Mano and M.D. Ciletti, *Digital Design.* Upper Saddle River, NJ: Prentice-Hall, 2007.<br>2. S. Yalamanchili, *VHDL – A Starter's Guide*, 2nd ed. Prentice-Hall, 2005.<br>3. E.O. Hwang, *Digital Logic and Microprocessor Design With VHDL*, 1st ed., CL-Engineering, 2006. | |
| **Last Updated** | June 2020 | |
| **Prepared by** | Mr Ivan Lau | |