**MODULE TITLE**: Digital Circuits Design  
**CODE**: EEU33C08  
**LEVEL**: Junior Sophister  
**CREDITS**: 5  
**PREREQUISITES**: None  
**LECTURER(s)**: Mr. Eugene O’Rourke  
**TEACHING SUPPORT**: Mr. John Squires  
**TERMS**: Semester 2  
**DURATION (WEEKS)**: 12  
**LABORATORIES**: 10  
**TOTAL**: 10  
**TUTORIALS**: 0  
**TOTAL**: 0

### AIMS/OBJECTIVES

The main purposes of the project are:

- To develop the student's practical knowledge of digital logic gates, circuits containing synchronous logic, and the use of microprocessors such as the PIC and Arduino.
- To gain further experience in the design, simulation, implementation & testing of digital circuits.
- To develop the ability to work on a project as a member of a team.
- To develop report writing skills

### SYLLABUS

- Fundamental building blocks of digital circuits from gates to system level devices.
- Frequently used important blocks like decoders, multiplexors, flip-flops, shift registers, counters and timers.
- Use of block diagrams, circuit schematics with MULTISIM, circuit simulation & testing.
- Use of micro-controllers (Arduino) to implement tests of various stages of the electronic circuit.
- Analysis and design of combinational and synchronous digital systems.
- Maintaining good engineering documentation.

### RECOMMENDED TEXT(S)


### LEARNING OUTCOMES

On successful completion of this project the student will be able to:

1. Describe and plan a project involving digital electronics.  
2. Construct a hardware solution for a digital electronics problem.  
3. Sketch a block diagram of the circuit along with user interfaces.  
4. Select a definite test strategy to check each stage of the design.  
5. Obtain and describe timing waveforms.  
6. Write a structured comprehensive technical report on the project.  
7. Work as part of a team.
**TEACHING STRATEGIES**
The hardware construction of two real working circuits is required – one introductory project, and one more challenging circuit. The project is launched from introductory laboratory exercises with CMOS ICs. Support is on hand from the demonstrator and technical officers throughout the project.

**ASSESSMENT MODE(S)**
The individually assessed written report will constitute 60% (10% + 50%) and the group-assessed in-lab practical work will contribute 40% of the overall project mark.

The Design Project will be marked entirely by continuous assessment. Marks will be awarded for attendance and in-laboratory performance as well as for the final technical reports submitted. Students will only be awarded a final mark for the module if they attend laboratory sessions and submit a project report. Students who attend laboratory sessions but do not submit a project report will receive a zero mark, as will students who do not attend the laboratory sessions but submit a report. The accrued mark will form 100% of the module mark at the Annual Examinations.

**SUPPLEMENTALS**
Failing students who are required to take a Supplemental Examination in this module will either be required to attend the laboratory and carry out **ALL** aspects of an arbitrarily selected design project over one day, including the reporting, the week preceding the written Supplemental Examinations in Michaelmas term OR take a written exam which will be decided by the lecturer.

**Note:** While this is a group project, each student must submit an individual report.