Queen Mary
University of London
Science and Engineering

EBU4202: Digital Circuit Design Overview 2023-24

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Who is this module for?

All Year 2 students study this module:

- Telecommunications Engineering with Management
- Internet of Things Engineering
- Electronic Information Engineering
- Intelligent Science and Technology

All students will study the same material and will sit the same assessments (although class tests for each group could be different)

Teaching Team Introduction

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Information

- **Course website**:
  - Login to QM+
  - Course Area: EBU4202 – Digital Circuit Design
  - Check it regularly for lecture notes, tutorials, etc. Also for additional information e.g. *extra practice exercises*, tutorial question solutions, *etc.*
- QM+ General Announcements will be used to post messages to all the students
- QM+ Forum is to be used for you to post questions about the module or topics. We will reply on the Forum as soon as we can, either to all students or privately if that is more suitable

Email Accounts

- It is very important that you check the QM+ announcements or your email regularly to stay up to date with the module.
- You are expected to use your QMUL email account, as that is what QM+ will use. It is your responsibility to check your QMUL account.
- You can also use your BUPT email address, but emails sent from an account other than QMUL or BUPT will not be answered.

Textbooks

- Required Textbook:
  - *Digital Design: Principles and Practices*, by John F. Wakerly, 5th Edition, Pearson Education

    PRINT ISBN: 9780134460093.

    EBOOK ISBN: 9780135304655

  QMUL | Library Search, use your QM credentials
  - https://ebookcentral.proquest.com/lib/gmul-ebooks/detail.action?docID=5581923

- Two other recommended books are:

  Digital Design by M. Morris Mano; 3rd Edition; Prentice Hall 2002; ISBN 0130621218

  Digital Design from Zero to One by Jerry D. Daniels; John Wiley & Sons Inc. 1996; ISBN 0471124478.

Assessment

- Exam: 2 hours, 4 compulsory questions;

  overall weighting 75%
- Coursework: Overall weighting 25%
- **There is a coursework hurdle of 30%**:
  (Your total coursework mark must be at least 30% for you to be able to pass the module)
- Coursework: 3 Labs + 2 Class Tests, equally weighted (5% each).
- The class tests will be short and held in-class, usually at the end of each half.
- The labs will be held between teaching blocks and will be supported by TAs.

Note for Labs

- The labs are hardware labs where you will use digital devices to test their operation and to construct and test circuits.
- The lab sheets will be made available before the lab sessions and require you to do preparation before you attempt the practical lab work.
- You must read the lab sheets and do the preparation before the lab. If you wait till the lab session to do the preparation, you will not have enough time to complete the lab.
- The completed lab sheets must be handed in at the end of the lab session. Late submissions will not be accepted resulting in a score of 0!

Coursework Timetable

There are 3 labs:

Lab 1 Week 4

Lab 2 Week 11

Lab 3 Week 12

Detailed arrangements will be for each class will be announced later.

There are 2 class tests (the dates are to be confirmed):

Test 1 in week 3

Test 2 in week 9

Topics Outline

Number Systems & Codes: Number System Conversions & Arithmetic / Binary Codes / Error Codes

Boolean Algebra & Basic Logic Functions: Truth tables / Operator precedence / Boolean Algebra / Canonical Products and Sums

Map Minimisation: Karnaugh Maps / Sum-of-Products & Product-of-Sums/All-NAND

Combinational Logic: Design of Logic Functions including Adders / Code Converters / Comparators

Sequential Logic: Latches and Flip-Flops / Counters / State Diagrams / State Machine Design & Analysis

Memory Devices: ROM/SRAM/DRAM

Digital System Blocks: Multiplexers / Arithmetic Logic Unit (ALU) / Microcomputer Block Diagram

Breakdown of Topics

The topics are split into 4 blocks corresponding to the 4 teaching weeks:

Block 1: Number Systems and Codes; Basic Logic Functions; Switching Algebra

Block 2: Logic Families; Karnaugh Maps; Combinational Logic

Block 3: Sequential Logic

Block 4: Memory Devices; Digital System Blocks

Topics Outline

- **What & Why**:
  - Learn how to design digital electronic circuits, so that we can build systems that solve practical problems.
  - Provide the knowledge and understanding that may be required for future study and applications.
  - Lay a foundation for understanding this digital world.
- **How**:
  - Introduce the basic theorems of digital logic.
  - Present techniques for designing and analysing digital circuits.
  - Describe the function and operation of devices and building blocks used in digital circuits and systems.

Students' Responsibility

To succeed, you MUST…

- Put the effort in.
- Attend all the lectures, tutorials, and labs.
- Make good use of available resources.
- For example, in addition to the teaching materials provided, you can access textbooks in the library or online and attempt relevant questions to increase your understanding.
- Aim to fully understand new concepts.
- Ask questions if you do not understand something.
- Don't leave all the revision till the end.

Module representatives

- Collect feedback from classmates about the lectures at the end of each teaching week
- Assist lecturers to prepare the content of revision lecture
- Provide reports and attend the SSLC meetings
- It will be an excellent addition to your CV.
- Volunteers (two) from each teaching group will be welcomed or chosen during the first teaching week of the module.

Finally....

Good Luck!

Enjoy the Lectures!

Do not be afraid to interrupt us to ask questions or ask for clarification. We would prefer that you do so rather than wait till it is too late.