University of Glasgow

电子科技大学格拉斯哥学院
Glasgow College, UESTC

UESTC1008: Microelectronic Systems

Academic year 2019/2020 – Semester 2 – Presentation 1

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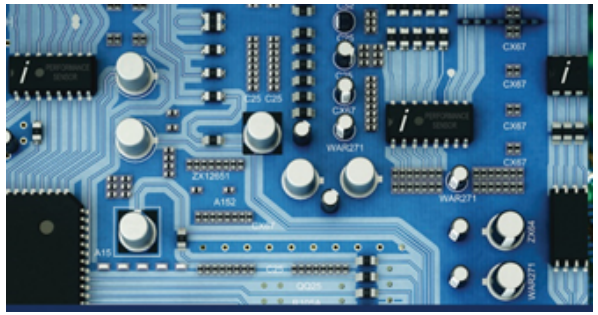
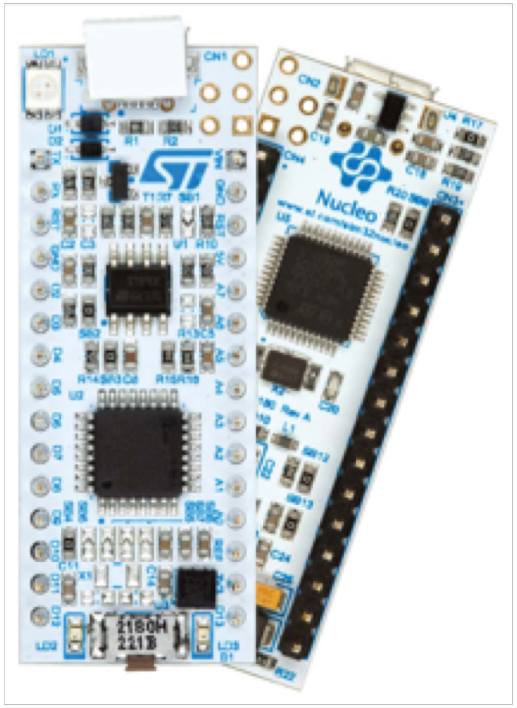
"A good student never steals or cheats"

Agenda



- Introduction
- What is this course all about and course outcomes?
- Logistics
- Syllabus / policies
- Summary



Contact Info

5 Academics:

Dr. Qammer H. Abbasi,

Dr. Lei Zhang,

Dr. Sajjad Hussain

Dr. Guodong Zhao

Prof. Muhammad Ali imran



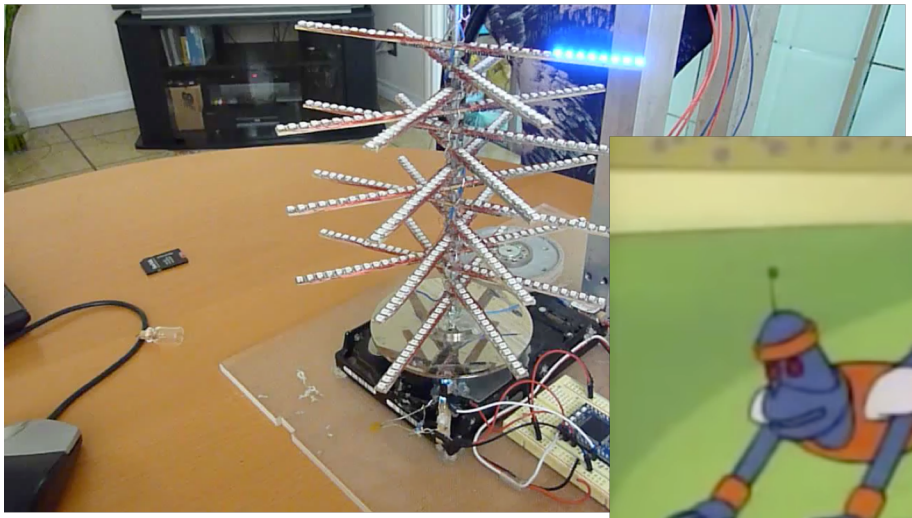


Office hours: Main building office A1-308 (lunch time, best to confirm with each individual academic)

The course has 3 **lectures,** and mandatory 1 **laboratory** per week (at Research Building B216) -> please refer to your own timetable (different for EEE and EEE+Comms programmes)

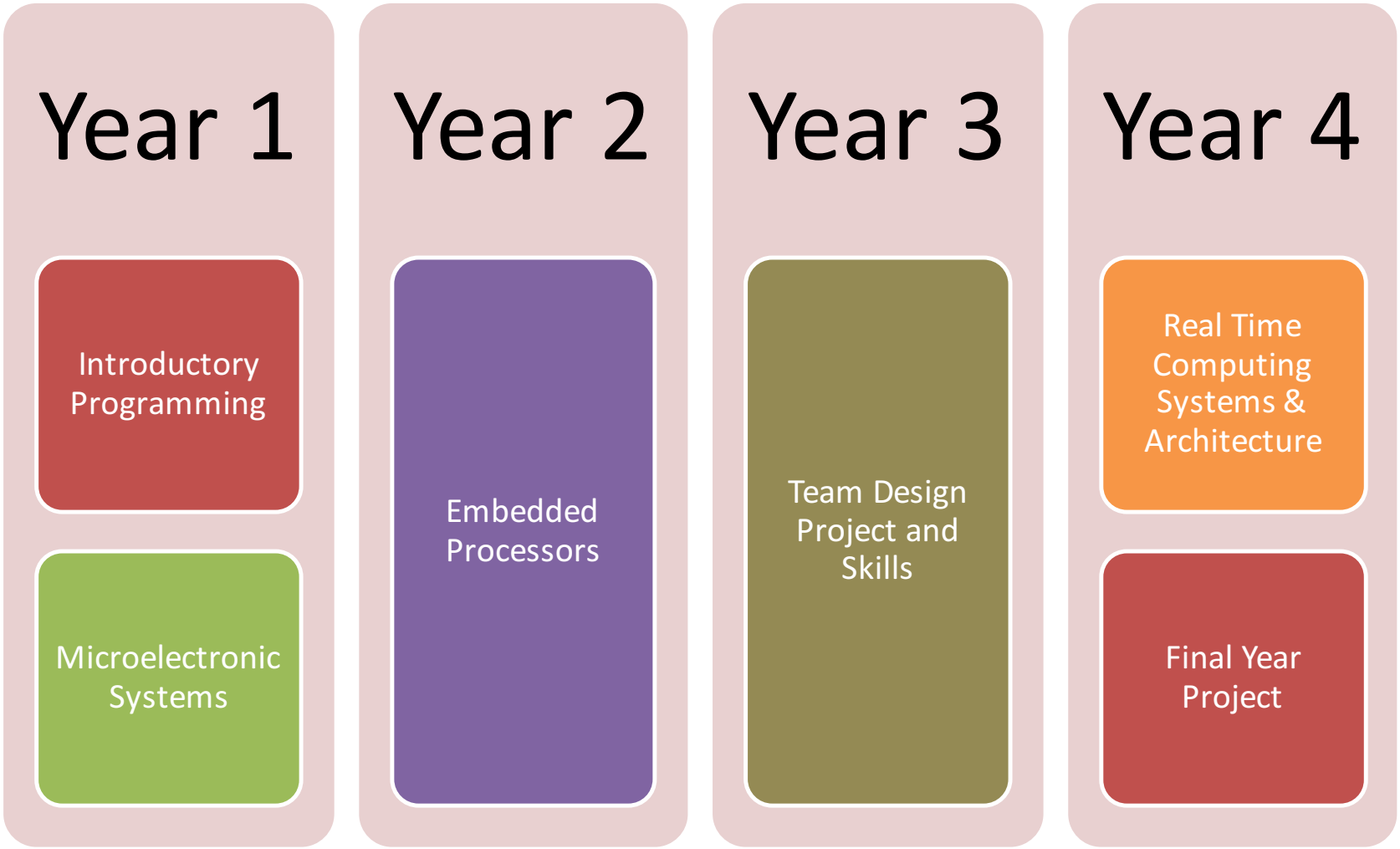
What, Why and How of the Course

- What is this course about?
- Why I need to study this course?
- How I need to learn this course?



https://www.youtube.com/watch?v=6feEE716

Road Map


Year 1
Introductory Programming
Microelectronic Systems
Year 2
Embedded Processors
Year 3
Team Design Project and Skills
Year 4
Real Time Computing Systems & Architecture
Final Year Project

Course Aims

- The aims of this course are to:
  - introduce basic concepts associated with embedded microelectronic systems, illustrated by circuits that include a small, modern microcontroller;
  - give theoretical and practical experience of designing, building and testing microelectronic systems with a development kit for a simple microcontroller interfaced with discrete components and external peripherals; and
  - develop skills in systematic design and documentation.

Intended Learning Outcomes

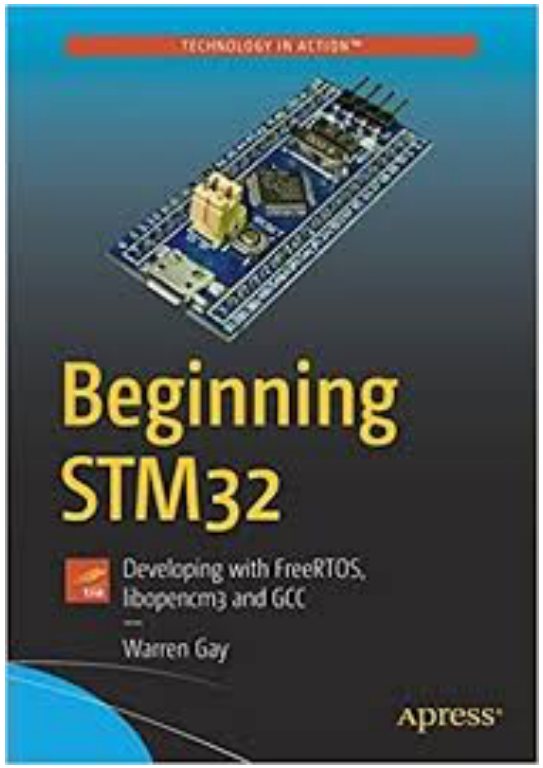
- By the end of this course students will be able to:
  - describe the different computer and microcontroller architectures and the basic components including ALUs, program and data memory, input/output ports, registers, data busses and address busses;
  - apply basic concepts of binary logic, the fundamental operations (NOT, AND, OR, etc.) and the corresponding logic gates to the design and analysis of simple combinational logic circuits;
  - describe the operation of a D-type flip-flop as the basic unit of binary memory and its use as a shift register in applications, including the conversion between serial and parallel data;

Intended Learning Outcomes

- ILO Continue….
  - analyse the operation of analogue-to-digital and digital-to-analogue converters integrated on the microcontroller system by applying the principal of number systems and base conversion;
  - calculate the voltages expected in a practical circuit when the basic operation of a diode and a MOS transistor are modelled as switches; and
  - construct and debug programs using a high-level programming language that use a subset of microcontroller functionality to carry out basic logic and arithmetic operations and perform infinite and finite loops after choosing interface circuitry using information from device datasheets and record the results in a laboratory notebook.

Reference Books

- You are **not required** to buy any textbook
- Recommended books for reference are:



(Tentative) Lectures Plan

Week	Lecture Topics	Laboratory Topics
1	Course introduction, Mbed details Programming recap, embedded C for mbed, Architecture	Getting started with Mbed
2	Architecture and digital I/O, PWM, CMOS, DAC	Exercise 1-9 Submit project proposal
3	ADC, number operation, logic gates, MUX, DEMUX,	Exercise 1-9 Working on the project
4	Flip flops, Registers	Demonstrate your mbed based design project

Course Material

- All course material will be available on **Moodle**
  - Syllabus
  - Lecture notes
  - Supplemental Resources
  - Lab manual and Datasheets
  - Videos
  - Past exam papers

Course Assessment

- Closed Book Examinations - 85%
  - Midterm – 15%
  - Closed book exam during Week 11 (date will be announced later)
  - Final Exam – 70%
  - Closed book exam at the end of the semester (during week 18, 19, 20)
- Lab Exercises & Project – 15%
  - Lab Exercises – 5%
  - Individual Design Project – 10%

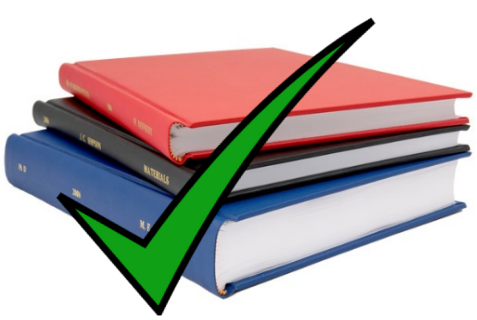
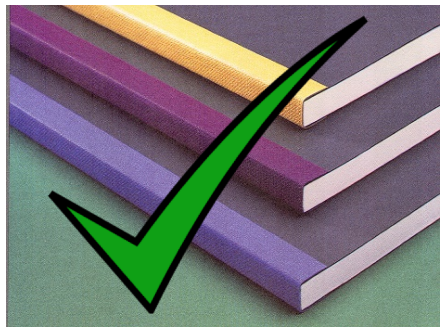
Exams (Mid and Final) shall have questions from lectures as well as labs!

Requirements for Grade

- To receive a grade at the end of the course, you must:
  - attend all the labs (total 4 lab sessions)
  - complete at least 7 lab exercises (total 9 exercises)
  - the Individual Design Project, and
  - attend all the exams (midterm and final)
- If you fail to fulfil any of the above requirement, you will not receive grade, you will be given “CW”.
- CW (Credit Withheld) means that you have not completed some part of the assessment (exam, laboratory report, etc) but can still do so before the next academic year. Contact the course lecturer if you are in doubt as to what you need to do.

Lab Manual

- Lab manual is available on moodle under “Lab Assignments” tab
- You are required to bring your lab manual with you for each lab session. Therefore, you need to print the lab manual and get it bounded
- A loose-leaf lab manual will NOT be acceptable
- Lab books will be collected at the end of 3rd lab session.

Lab Report

- During first three lab sessions you must complete all the lab exercises (at least 75% of the lab exercises, i.e. 7 out of 9 to avoid CW)
- Specific exercises (milestones) are described in the lab manual and you will be assessed at the end of each exercise
- You are required to complete questionnaires (lab report) at the end of each lab exercise which includes
  - Objectives
  - Procedure
  - Your C-code
  - Learning outcomes

Lab Report

- This is what we would like you to record in your lab report (this should be written as you do the experiment)
  - Brief objectives of each experiment
  - Anything special you had to do
  - What you observed (fix printouts into your book)
  - Calculations and the results
  - The most important thing is to explain why you did something
- Why did you choose a given component ?
- Why did you do the calculation ?
- Why did you write the code in that particular way ?
  - What you learnt from the experiment
  - Imagine that you are explaining the experiment to someone else.
- What we don't want to see :
  - Material copied from the instruction sheet
  - Results written on scraps of paper to be coped in later
  - Anything copied from someone else's lab notebook at all !

Lab Marking

- You will work in pairs on the mbed and computer but complete your own lab report independently
- When you have completed an exercise (milestone) and lab report, you can call a demonstrator to show your work, output and report
- You and your lab partner must answer all the questions about each exercise
- This is a team effort! You will not receive full credit if you can answer the questions, but your lab partner can not

Design Project

- Individual Effort
  - Idea for design can be your own or found by looking at other design projects on the mbed website, in a book, or elsewhere.
    - Creativity will be part of the grade so your own idea is worth more as is your variation on other's designs
  - However, you must:
    - Write the code for the mbed yourself.
    - Determine the components that are needed for the design.
    - Construct and test the design.
    - Describe the design during the demonstration.
  - Work should be documented in your lab notebook

Design Project

- Projects will be categorized on their difficulty level
  - Challenging
  - Medium
  - Easy
- Does it work
  - Working as required
  - Partially working
  - Does not work at all
- Your understanding and learning
  - Question/Answer

Labs and Project Timetable

- Week 1 - Lab session 1
  - Getting Started with the mbed
    - Register on the mbed website
    - Connect to the mbed compiler website
    - Run a program
  - Start Exercises 1-9
- Week 2 - Lab session 2 &3
  - Work on exercises 1-9
  - Start planning for your design project
- Lab session 2
  - Submit project proposal/description on moodle
- Lab session 3
  - Identify components needed for your design/submit component request form
- Week 3 - Lab session 3
  - Work on your project/help session, Submit your lab manuals.
- Week 4 - Lab session 4 (assessment week)
  - Demonstrate your mbed based design project

mbed

- Each one of you will receive an mbed microprocessor board.
  - You and your lab partner will use either yours or your partner's mbed during the first three lab sessions.
  - You will use it to complete your design project, a project that you will:
    - Decide by yourself; you must come up with the idea
    - Design, construct, and demonstrate yourself; there won't be instructions given to you
  - A project list will also be available on moodle, which you can use as starting point to generate/extend your own ideas
  - The mbed website www.mbed.org is going to be a key resource for the work on microcontrollers

How to learn from the Course?

- Attend all the lectures and lab sessions
- Loads of self-study
- Spend time in the lab, write code, test it, change it, play with mbed
- Solve problems from the books and online
- Solve past exam papers

Summary

- Introduction
- Course contents
- Grading policy
- Course is all about and its outcome
- What will we study in next lecture.