

COURSE OUTLINE

Department & Faculty: Electrical Engineering Faculty	Page : 1 of 4
Course Code: SEE 3223 Microprocessor Total Contact Hours: 42 hours	Semester: 2 Academic Session: 2012/2013

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Synopsis : This course introduces the principles and applications of microprocessors. Topics emphasized are processor architecture, assembly and HLL language and fundamentals of interfacing in a microprocessor-based embedded system. This course emphasizes on the understanding the fundamentals of microprocessor operation, writing coherent and error-free assembly and HLL language programs, and designing basic interfacing circuits. With the knowledge learned, the student would be able to design microprocessor-based systems using assembly language and HLL programs completely with confidence.

LEARNING OUTCOMES

By the end of the course, students should be able to:

No.	Course Learning Outcome	Programme Outcome	Taxonomies and Soft-Skills	Assessment Methods
CO1	Describe and differentiate all the components of microprocessor-based systems.	PO1	C4	Q, F
CO2	Analyze and design completely with confidence using assembly language and HLL programs.	PO3	C5, P4, A2, CTPS1-3	Q, HW, F
CO3	Design complex microprocessor based systems that meet design specifications.	PO5	C5, P4, A2, CTPS1-3	HW, PR, Pr
CO4	Communicate effectively in a team to solve complex design problems.	PO6, PO7, PO12	P3, A3, CS3, TS1-3	HW, Pr

(T - Test ; PR - Project ; Q - Quiz; HW - Homework ; Pr - Presentation; F - Final Exam)

Prepared by: Name: KAMAL KHALIL Signature: Date: 19 February 2012	Certified by: (Course Panel Head) Name: Signature: Date:
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STUDENT LEARNING TIME (SLT)

Teaching and Learning Activities	Student Learning Time (hours)
1. Face-to-Face Learning	
a. Lecturer-Centered Learning <ul style="list-style-type: none"> i. Lecture 	36
b. Student-Centered Learning (SCL) <ul style="list-style-type: none"> i. Laboratory/Tutorial ii. Student-centered learning activities - Active Learning, Project Based Learning 	6
2. Self-Directed Learning	
a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	32
b. Revision	18
c. Assessment Preparations	23.25
3. Formal Assessment	
a. Continuous Assessment (inclusive of presentation)	5.25
b. Final Exam	2.5
Total (SLT)	123

TEACHING METHODOLOGY

- Lecture and class discussion.
- Written Quizzes and Final Examination.
- Active Learning Approach - Group Assignments.

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WEEKLY SCHEDULE

Week 1	:	Topic 1: Introduction to Embedded Systems Definition of embedded systems, Flavors of embedded systems (board level, SoC, levels of hardware customization), Major components (proc, memory, i/O), Design considerations (power, cost, performance, tools selections, etc), Technology options (off-the-shelf, semi-custom, ASIC, FPGA), Design process (specifications, hardware/software partitioning, h/w design, s/w design, integration, testing - verification and validation).
Week 2	:	Topic 2: : Introduction to AVR Architecture Definition of computer architecture, processor operation, CISC vs RISC, von Neumann vs Harvard architecture, register set design considerations, ALU operation, buses
Week 3	:	Topic 3: Embedded System Programming Addressing Mode, Register set, ALU, machine instruction format, 1 or 2 example machine instructions, introduction to AVR Studio.
Week 4	:	Topic 4: Assembly Language Programmin
Week 5	:	Topic 5: Arithmetic and Logic Instructions
Week 6	:	Topic 6 : Shift and Rotate Instructions
Week 7	:	Topic 7: Program Control Instructions
Week 8	:	Mid-Semester Break
Week 9	:	Topic 8: Stacks & Subroutines
Week 10	:	Topic 9 : System Integration and Planning
Week 11	:	Topic 10: Hardware and Software Design: Introduction to Interfacing Interfacing with LED, switches, single vs multiple devices -> masking technique, debouncing.
Week 12	:	Topic 11: Interrupts Programmed I/O vs interrupt-driven I/O, writing ISR for previously introduced devices.
Week 13	:	Topic 12: Timer/Pulse Width Modulation
Week 14	:	Topic 13: Interfacing A/D and D/A's Convertor: Interfacing III Interfacing with SPI and I2C devices (temperature sensors, serial EEPROM, real time clock, a/d, d/a).
Week 15	:	Topic 14: AVR Applications Case studies selected by lecturer.
Week 16-18	:	Revision Week and Final Examination

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TEXTBOOK:

1. Steven F. Barrett, Daniel J. Pack, "Atmel AVR Microcontroller, Primer: Programming and Interfacing", Morgan & Claypool Publishers, 2008.
2. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, "The AVR Microcontroller and Embedded System, Using C and Assembly", Prentice Hall, 2009.

GRADING:

Item	Mark (%)	No of test/quiz/assignment	Duration
Assignments (Group)	15	1	
Presentation (Evaluation of TS3, CS3)	5	1	15 minutes
Quizzes	30	4 (best 3-of-4)	4 hours
Final Exam	50	1	2.5 hours