University of Macau

Faculty of Science and Technology

Department of Electrical and Computer Engineering

Part A: Course Outline

Course Title:	Microprocessors		
Course Code:	CPTG300	Year of Study:	3
Course Mode:	Theoretical with substantial laboratory/ practice content		
Compulsory/Elective:	Compulsory		
Course Prerequisites:	ELEC210		
Prerequisite Knowledge	Digital circuits		
Class/Laboratory Schedule:	3-hours lecturer, 2-hours tutorial/lab per week		
Duration	1 semester	Credit Units	4
Text Books and References:	[1] Thomas W. Schultz, C and the 8051, Programming a nd Multitasking, Prentice Hall [2] MCS-51 User's Manual, Intel [3] A Simplified Guide to Using the MCS51 On-chip UART [4] Tom Williamson, Designing With The 80C51BH, Intel		
Course Description:	The course is for EEE students to lear n the principle and how to program a microprocessor. S tudents will a lso have the ability to design a basic microprocessor system.		
Topics Covered	1. Introduction 2. Architecture 3. Memory and Register 4. Programming a Microprocessor 5. Interrupt 6. Input / Output 7. Timing 8. Examples		
Course Objectives:	1. To introduce to students the general architecture and principles of microprocessors, [a, e, k] 2. To prepare students to know how to program a microprocessor related to hardware level, [a, b, e, k] 3. To prepare students to have the ability in designing a microprocessor system, [a, b, c, d, k, e, g] 4. To develop students with an understanding of the timing problems when designing a digital system. [a, b, c, e, k]		
Course Assessment:	Assignments: 5% Labs: 25%		

<table>
<tr><td></td><td>Quiz :10%
Mid-term Exam. : 30%
Final Exam. : 30%</td></tr>
<tr><td>Relationship to Program Objectives and Outcomes</td><td>This course primarily contributes to EEE program outcomes that develop students abilities to:
a. Ability to apply knowledge of mathematics, science and engineering.
b. Ability to design and conduct experiments.
c. Ability to design a system, component or process to meet desired needs.
k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
l. Ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations

This course secondarily contributes to EEE program outcomes that develop students abilities to:
d. Ability to function on multidisciplinary teams
e. Ability to identify, formulate and solve engineering problems.
g. Ability to communicate effectively.</td></tr>
<tr><td>Course Contents and Relationship to Program Criteria:</td><td>
<table>
<tr><th>Week no.</th><th>Topics</th><th>Program Criteria</th></tr>
<tr><td>0.5</td><td>Introduction
What, Why, When microprocessors, its history and trend</td><td>CS, ES</td></tr>
<tr><td>0.5</td><td>Architecture
The basic components and architecture in a microprocessors, concepts of bus and cycle</td><td>CS, ES</td></tr>
<tr><td>1.5</td><td>Memory and Register
What is memory and register, their roles in a microprocessor, memory space and address</td><td>CS, ES</td></tr>
<tr><td>2.5</td><td>Programming a Microprocessor
Data representation, assembly language, addressing method, programming technique</td><td>CS, ES, DM</td></tr>
<tr><td>1</td><td>Interrupt
Concepts of interrupt, type of interrupt, interrupt service subroutine, interrupt handling</td><td>CS, ES</td></tr>
<tr><td>2</td><td>Input / Output
Input and output devices for microprocessors, programmable IO and non-programmable IO</td><td>BS, CS, ES</td></tr>
<tr><td>2</td><td>Timing
Timing digram, timing information</td><td>PS, BS, CS, ES</td></tr>
<tr><td>2</td><td>Examples
Examples for microprocessors</td><td>PS, BS, CS, ES, LA, DM</td></tr>
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</td></tr>
<tr><td>Contribution of Course to meet the professional</td><td>This course prepares students the professional skills and knowledge of the microprocessor system design. Students should be able to design an basic processor system for different applications.</td></tr>
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component:	
Course Instructor(s):	Prof. Vai Mang I
Prepared by:	Prof. Vai Mang I

Part B: General Course Information and Policies

Instructor: Prof. Vai Mang I Office: N508 Phone: 4958
Office Hour: TBA
e-mail: fstmiv@umac.mo

Programme Educational Objectives

1. **Problem Solving:** Graduates have the ability to think in a critical and evaluative manner and to consider a broad perspective, in order to solve technical and nontechnical problems.
2. **Leadership and Communication:** Graduates will provide effective leadership, act in an ethical manner and skills will include the ability to communicate well and to work successfully within diverse groups.
3. **Market Acceptance:** Graduates will have successful careers in the academic environment, industrial and government organizations.
4. **Technical Competence:** Graduates will be technically competent and have a thorough grounding in the fundamentals of math and science in electrical and computer engineering and experience in engineering design. They will be able to use modern engineering techniques, skills, and tools to fulfill societal needs.

Scale: 1 (Highest) to 4 (Lowest)

	Problem Solving	**Leadership and Communication**	**Market Acceptance**	**Technical Competence**
Microprocessors	1	4	2	1

Remark:

- Objective for "Problem Solving" can be achieved by assignments, laboratories, mid-term exam, final exam and projects.
- Objective for "Leadership and Communication" can be achieved by report writing and presentation. However, leadership training is not given by this course.
- Objective for "Market Acceptance" can be achieved by the course contents that are required in industries.

- Objective for "T echnical Competence" can be achieved by us ing fundamentals of m ath and science in electrical and com puter engineering and experience in engineering project design and computer simulation.

Program Criteria Policy:

Course VS Program Criteria

Scale: 5 (Highest) to 1 (Lower)

Course	PS	DIC	BS	CS	ES	DE	LA	CV	DM
Mircoprocessors	1	-	1	5	4	-	1	-	2

Terms:

Probability and Statistics (PS), Differential and Integral Calculus (DIC), Basic Science (BS), Computer Science (CS), Engineering Science (ES), Differential Equation (DE), Linear Algebra (LA), Complex Variables (CV), Discrete Mathematics (DM)

Program Outcome Policy:

Course VS Course Outcomes

(H= Highly Related, S = Supportive, N = None)

Course	a	b	c	d	e	f	g	h	i	j	k	l
Microprocessors	H	H	H	S	S	N	S	N	N	N	H	H

The electrical and electronics engineering program outcomes are:

a. Ability to apply knowledge of mathematics, science and engineering.
b. Ability to design and conduct experiments.
c. Ability to design a system, component or process to meet desired needs.
d. Ability to function on multidisciplinary teams.
e. Ability to identify, formulate and solve engineering problems.
f. Understanding of professional and ethical responsibility.
g. Ability to communicate effectively.
h. Broad education necessary to understand the impact of engineering solutions in global and societal context.
i. Recognition of the need for and an ability to engage in life-long learning.
j. Knowledge of contemporary issues.
k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
l. Ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations

Curriculum Detail

CPTG300 Microprocessors

Timetabled work in hours per week			**No of teaching weeks**	**Total hours**	**No /Duration of exam papers**	**Max marks available from:**	
Lecturer	**Tutor**	**Practice**				**Exams**	**Course**
3	0	2	14	70	2/4 hours	30	70

Term: 6th

Hours			**Percentage content of**					
Lecturer	Lab/tut	Other	Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies
42	24/4	0	5	5	20	40 10		20

Design Elements

% of Design Content	**Design Content in Course Work**	**Design Project**	**Design Content in Laboratories**
50%	10% 0		40%

Course Assessment Policy:

- Homework assignments will be given to students according to the course progress, no late homework is accepted. Zero mark will be given when homework is copied.
- Very short quizzes (a few minutes each) will be arranged for students randomly at the beginning or at the end of a class during the semester.
- labs / projects will be performed during the semester. 1 - 3 students form one group (student number in a group is subject to approval) and group report should be handed up on time. Presentation / Demonstration may be required.
- 1 mid-term exam and 1 final exam will be performed with 2 hours for each.