اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Microprocessor & Assembly Language
Course Code:	315 CNET-3
Program:	Bachelor in Computer and Network Engineering Bachelor in Computer Science
Department:	Computer and Network Engineering
College:	College of Computer Science & Information Technology
Institution:	Jazan University

Table of Contents

A. Course Identification

1. Credit hours:	**03 hours**

2. Course type

a.   University ☐   College ☐   Department ☑   Others ☐

b.   Required ☑   Elective ☐

3. Level/year at which this course is offered: Level-7 / Year - 4

4. Pre-requisites for this course (if any)**:** Computer Organization and Architecture (213CNET-3)

5. Co-requisites for this course (if any)**: Nil**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	52	100
2	**Blended**	--	--
3	**E-learning**	--	--
4	**Distance learning**	--	--
5	**Other**	--	--

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	22
2	**Laboratory/Studio**	22
3	**Tutorial**	--
4	**Others** (specify)	8
	Total	52

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

The purpose of this course is to teach the students about architecture of microcontroller, microprocessor and assembly language programming. Topics include introduction to microcomputer, microprocessor and detailed architecture of microcontroller. Also this course includes Assembly Language programming and application aspects of microcontrollers by including Arduino boards and its role in designing circuits.

2. Course Main Objective

- Introduce the concepts of microprocessor and Architecture of 8086.
- Compare microcontrollers and microprocessors.
- Describe the history of microcontroller and embedded systems.
- Explain microcontroller architecture and its functionalities.
- Develop programming skills in Assembly language.
- Explain sample programs for arithmetic operations and memory management.
- Introduce Arduino boards and recent trends in Arduino based microcontroller systems.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**Explain** the fundamentals of microprocessor and its architecture.	K1
1.2	**Explain** the architecture and functions of microcontroller 8051.	K2
1.3	**Describe** the developments in microcontrollers and Arduino.	K3
2	**Skills :**	
2.1	**Apply** addressing modes and programming constructs in Assembly language	S2
2.2	**Differentiate** Microprocessor and Microcontroller programming.	S5
2.3	**Conduct** the experiments and mini-projects with Arduino boards.	S5
3	**Values:**	
3.1	**Function** effectively as a member or leader of a team, engaged in programming activities.	V1

C. Course Content

No	List of Topics	Contact Hours
1	**Chapter – 1: Introduction to Microprocessors** • Microcomputer and Microprocessor • Intel Microprocessor Evolution • Architecture of 8086 microprocessor • Register organization and Flag register	4T+4P
2	**Chapter – 2: Microprocessors and Microcontrollers** • Introduction to Microcontrollers • Comparing Microprocessors and Microcontrollers • History and Classification of Microcontrollers • Microcontroller based embedded system.	4T+4P
3	**Chapter – 3: Microcontroller Architecture** • Von Neumann & Harvard Architecture • 8051 Microcontroller and Features • Block diagram and Pin descriptions of 8051 • Timer, Counter and PSW • 8051 Ports, RAM and Interrupts.	6T+6P
4	**Chapter – 4: Assembly Language Programming** • Introduction to AL programming • Addressing modes • Programming Examples • Arithmetic operations • Memory management	4T+4P
5	**Chapter – 5: Arduino Board and Functions** • Introduction to Arduino Boards • Hardware and Software • Types of Arduino • Pins and Functions of Arduino board.	4T+4P
6	Final Exam	4T+4P
Total		**52**

Online Study Topics
• Assembly Language Instructions • Modern Microcontrollers and features • Multi core architecture • Turbo Boost Technology • Hyper-Threading concepts • Applications of Arduino based systems • Role of Embedded systems in IOT • Arduino Boards and system design

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	**Explain** the fundamentals of microprocessor and its architecture.	Visual &Verbal [Lectures / Presentations]	Mid-Term Exam Assignment-1 Final Exam
1.2	**Explain** the architecture and functions of microcontroller 8051.	Visual &Verbal [Lectures / Presentations]	Mid-Term Exam Assignment-1 Final Exam
1.3	**Describe** the developments in microcontrollers and Arduino.	Visual &Verbal [Lectures / Presentations]	Mid-Term Exam Assignment-1 Final Exam
2.0	**Skills**		
2.1	**Apply** addressing modes and programming constructs in Assembly language	Visual &Verbal [Lectures / Presentations]	Assignment-2 Mid-term Exam Final Exam
2.2	**Differentiate** Microprocessor and Microcontroller programming.	Visual &Verbal [Lectures / Presentations]	Lab Exam Final Lab Exam
2.3	**Conduct** the experiments and mini-projects with Arduino boards.	Visual &Verbal [Lectures / Presentations]	Assignment-2 Mini projects Lab Exam
3.0	**Values**		
3.1	**Function** effectively as a member or leader of a team, engaged in programming activities.	[Group Assignments, Mini-projects and Presentations]	Lab Exam Mini-project

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments / Mini Project	4th Week	20%
2	Midterm Exam	6th Week	20%
3	Lab Exam	11th Week	20%
4	Final Theory Exam	12th Week	40%

Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Department have an arrangement for "Academic Counseling and Support" for each student. The academic advising committee nominates faculty members as "**Student Academic Advisor**" every semester. These "**Academic Advisors**" are responsible for student counseling and advising to a group of fix number of students (around 15 students) and maintaining students' files. At the beginning of semester and at time of course registration all students take counseling from Academic Advisor according to his previous grades and coverage of pre-requisite course and follow-up.

Also students with GPA below 2.00 are remained under deep observation and continuous meetings with respective course teachers about their performance are arranged to help and support the students. The course teacher is to be associated with this course provide a proper guidance for students who are looking to focus on their future career based on their intellectual interests, identify better opportunities related to this course and connections in their academic fields.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1. The 8051 Microcontroller. Architecture, Programming and Applns 2. A.K. Ray and K.M. Bhurchandi Advanced Microprocessors and Peripherals, third Edition, Tata McGraw Hill, 2012. 3. Massimo Banzi, Getting Started with Arduino , First Edition, pub. 2008
Essential References Materials	1. Barry B Bray , The Intel Microprocessor 8086/8088, 80186,80286, 80386 and 80486 Architecture, programming and interfacing, PHI, 8th Edition, 2009. 2. K Uday Kumar, B S Umashankar, Advanced Micro processors IBM-PC Assembly Language Programming, Tata McGraw Hill, 2002 3. Yu-Cheng Liu, Glenn A. Gibson, "The 8086/8088 Family Architecture, Programming and Design", PHI. 1986, Second Edition.
Electronic Materials	1. JazanUniversity: http://www.jazanu.edu.sa/sites/en/Pages/Default.aspx 2. Black Board: https://lms.jazanu.edu.sa/webapps/blackboard/execute/courseMain?course_id=_26807_1&task=true&src
Other Learning Materials	---

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and Laboratories are required with projectors.
Technology Resources (AV, data show, Smart Board, software, etc.)	EMU8086 Emulator
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Special microcontroller lab with trainer kits

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Sufficiency of resources and facilities for students	Students	Course evaluation survey form
Effectiveness of teaching / learning process	Students	Course evaluation survey form
Effectiveness of teaching / learning process	CRC / QAU / HOD	Course reports / result analysis
Quality of learning Resources	Track leaders / CRC	Review meetings and star rating with suggestions for further modification and improvements
Verifying standards of student achievement / evaluation	HOD / committee nominated by HOD	Random re-checking of evaluated answer sheets
Achievement of course learning outcomes	Course Teachers / QAU	CLO assessment template that is further verified at course coordinator, Track leader and QAU level.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council
Reference No.	
Date	