Course Specification

— (Bachelor)

Course Title: processor and Assembly LanguageMicro	
Course Code: CNET-321	
Program: Bachelor in Computer and Network Engineering	
Department: Electrical and Electronics Engineering	
College: College of Engineering and Computer Science	
Institution: Jazan University , Jazan	
Version: 1	
Last Revision Date: 25-09-2024	

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A. General information about the course:

1. Course Identification

1. Credit hours: (03)

2. Course type

A.	☐ University	☐ College	☒ Department	☐ Track	☐ Others
B.	☒ Required			☐ Elective	

3. Level/year at which this course is offered: (6th Level / Year 3)

4. Course General Description:

The purpose of this course is to teach the students about architecture of microcontroller, microprocessor, and assembly language programming. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microcontroller implementation. Topics include introduction to microcomputer, microprocessor, microcontroller architecture, assembly language programming and example programs. Also this course will give light to programming and application aspects of microcontrollers by including Arduino boards as an example. Laboratory exercises will be practiced using EMU8086 emulator or similar tools which is based on 8086 microprocessors.

5. Pre-requirements for this course (if any):

Computer Organization and Architecture (213CNET-3)

6. Co-requisites for this course (if any):

Nil

7. Course Main Objective(s):

- Introduce the concepts of microprocessors and microcontroller.
- Compare microcontroller and microprocessor.
- Explain microcontroller architecture and its functionalities.
- Develop microcontroller-based programs in Assembly language.
- Explain programming aspects and applications of microcontrollers.
- Introduce recent trends in Arduino based microcontroller systems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	--	--
3	Hybrid ● Traditional classroom ● E-learning	-- --	-- --
4	Distance learning	--	--

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	26
2.	**Laboratory/Studio**	26
3.	**Field**	--
4.	**Tutorial**	--
5.	**Others (specify)**	8
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Explain** the concepts of a microprocessor and microcontrollers.	K1	➢ Lectures ➢ Classroom Discussion	Midterm Exam Final Exam Assignment-1
1.2	**Explain** microcontroller architecture and Embedded Systems	K2	➢ Lectures ➢ Classroom Discussion	Midterm Exam Final Exam Assignment-1
1.3	**Describe** the current developments in	K3	➢ Lectures ➢ Classroom Discussion	Midterm Exam Final Exam

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	microcontrollers and Arduino boards			Assignment-1
2.0	**Skills**			
2.1	**Analyze** addressing modes and programming aspects of microcontrollers	S1	➢ Lectures ➢ Classroom Discussion	Midterm Exam Final Exam Assignment-2 Lab Exam
2.2	**Acquire** programming skills based on microprocessors/ microcontrollers.	S3	➢ Lectures ➢ Classroom Discussion	Final Exam Assignment-2 Mini-Project Lab Exam
2.3	**Conduct** the experiments and mini-projects with Microcontrollers.	S5	➢ Lectures ➢ Classroom Discussion	Final Exam Mini-Project Assignment-2
3.0	**Values, autonomy, and responsibility**			
3.1	**Encourage** the ability to function effectively as a member or leader of a team, engaged in programming activities.	V1	Lab Exercises	Lab Exam Mini-Project

C. Course Content

No	List of Topics	Contact Hours
1.	**Chapter 1: Introduction to Microprocessors** ● Introduction ● Microcomputer ● Microprocessor ● Evolution of Microprocessors	4T + 4P
2.	**Chapter 2:** Intel 8086 microprocessor ● Architecture of 8086 microprocessor ● Register organization and Flag register ● Instruction set of 8086	4T + 4P
3.	**Chapter 3: Microcontrollers and Embedded Systems** ● Comparing Microprocessors and Microcontrollers	5T + 5P

	• Microcontroller classifications • Embedded Systems – History • Tools For Developing Embedded Systems • Constraints, Characteristics and Functions • Mobile and Network embedded systems	
4.	**Chapter 4: Microcontroller Architecture** • Introduction • 8051 Microcontroller Hardware • Program Counter, Data Pointer • Registers, Flags, PSW, Internal Memory, RAM and ROM	4T + 4P
5.	**Chapter 5: Assembly Language Programming** • Addressing modes • Programming Examples • Arithmetic Operations • Memory management • Loops and Conditional branching	5T + 5P
6.	**Chapter – 6: Arduino and Applications** • Introduction to Arduino Boards • Features and Functions • Arduino UNO • Applications of Arduino	4T+4P
7.	**Final Exam**	4T+4P
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignment - 1	5th week	10%
2.	Midterm Exam	7th-8th week	20%
4.	Assignment – 2 / Mini-project	11th week	10%
5.	Lab Exam	13th week	20%
6.	Final Theory Exam	14th week	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. The 8051 Microcontroller. Architecture, Programming and Applications. 2. A.K. Ray and K.M. Bhurchandi Advanced Microprocessors and Peripherals, third Edition, Tata McGraw Hill, 2012. 3. Raj Kamal, Embedded Systems: Architecture, Programming and Design, Second Edition.

Supportive References	1. Barry B Bray , The Intel Microprocessor 8086/8088, 80186,80286, 80386 and 80486 Architecture, programming and interfacing, PHI, 8th Edition, 2009. 2. Massimo Banzi, Getting Started with Arduino , First Edition, pub. 2008 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. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	One Lecture room equipped with projector.(maximum 30 students at a time)
Technology equipment (projector, smart board, software)	EMU8086 Emulator
Other equipment (depending on the nature of the specialty)	Special microcontroller lab with trainer kits

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Course Evaluation survey form
Effectiveness of Students assessment	HOD/Committee nominated by HOD	Random re-checking of evaluated answer sheets
Quality of learning resources	Track Leaders	Review meetings and star rating with suggestions for further modification and improvements
The extent to which CLOs have been achieved	Course Teachers and Course Coordinators/QAU Course Coordinators QAU	CLO assessment template that is further verified at course coordinator, Track leader and QAU level.
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	DEPARTMENT COUNCIL
REFERENCE NO.	ENGCSEEE2411
DATE	10/10/24