MICROPROCESSORS Programme Course Description

CODE	NAME OF THE COURSE UNIT	SEMESTER	IN-CLASS HOURS (T+P)	CREDIT	ECTS CREDIT
CTE200	**Microprocessors**	1	4	3	6

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit:	**Bachelor's Degree**
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Dr. Ahmad F. Al-Allaf**
Instructor(s) of the Course Unit	**Dr. Ahmad F. Al-Allaf**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	To familiarize students with architecture, programming, and hardware of microprocessor. The course includes studying the internal architecture of the 8086 processor and the interaction between its components. As well as studying the connection pins of the 8086 processor and the different signals carried by these pins and the basic interface circuits. In addition, the different processor instruction sets are studied.
Contents of the Course Unit:	1- introduction 2- 8085 and 8086 internal architectures and pins descriptions 3- Basic interface circuit 4- 8086 instruction sets

Week	KEY LEARNING OUTCOMES OF THE COURSE UNIT On successful completion of this course unit, students/learners will or will be able to dealing with:
1	**Introduction to Microprocessor:** Introduction and History of Microprocessors, Basic Block Diagram of a Microprocessor, Organization of Microprocessor Based System, Bus Organization, Processing Cycle of a Stored Program Computer.
2	**8085 Microprocessor:** Internal Architecture and Features of 8085 microprocessor, pin description.
3	**8086/8088 Microprocessor:** Internal Architecture and Features of 8086 Microprocessor, components of BIU and EU.
4	**8086 Microprocessor:** Pin descriptions and bus cycles.
5	**8086 Microprocessor:** Pin descriptions and bus cycles.
6	**8086 Microprocessor:** 8284 clock generator and 8288 bus controller circuits
7	**8086 Microprocessor:** Minimum and Maximum configurations, Memory and I/O organization.
8	**8086 programming and instruction sets** 8086 Addressing Modes, instruction groups
9	**8086 instruction sets:** Data Movement instructions
10	**8086 instruction sets:** Arithmetic and logical instructions
11	**8086 instruction sets:** Jump instructions
12	**8086 instruction sets:** String instructions
13	**8086 instruction sets:** Programming examples
14	**Different Microprocessor Architectures:** Register Based and Accumulator Based Architecture, RISC and CISC Architectures, Digital Signal Processors.
15	**Final Exam.**

No.	PRACTICAL PART
1	**Lab 1:** Introduction to debugging program
2	**Lab 2:** 8086 instruction formats
3	**Lab 3:** 8086 addressing modes
4	**Lab 4:** Program examples of Data movement instructions
5	**Lab 5**: Program examples of Arithmetic instructions
6	**Lab 6**: Program examples of Arithmetic instructions (addition and subtraction)
7	**Lab 7**: Program examples of Arithmetic instructions (Multiplication and division)
8	**Lab 8:** Program examples of logical instructions
9	**Lab 9:** Program examples of shift and rotate instructions
10	**Lab 10:** Program examples of timing delay using counters
11	**Lab 11:** Program examples of JMPs instructions
12	**Lab 12:** Program examples of stack instructions
13	**Lab 13:** Program examples of strings instructions
14	**Lab 14:** Program examples of call and return instructions

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT :	**CTE200 MICROPROCESSOR**		
WORKLOAD FOR LEARNING & TEACHING ACTIVITIES			
TYPE OF THE LEARNING ACTIVITIES	LEARNING ACTIVITIES (# OF WEEK)	DURATION (HOURS, H)	WORKLOAD (H)
Lecture & In-Class Activities	**15**	**2**	**30**
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	**14**	**2**	**28**
Reading	6	1	6
Assignment (Homework)	3	2	6
Project Work	3	4	12
Seminar	**3**	**1**	**3**
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	6	3	18
Final Exam	**1**	**3**	**3**
Preparation for the Final Exam	1	20	20
Mid-Term Exam	1		
Preparation for the Mid-Term Exam	1	12	12
Short Exam (Quizzes)	3	2	2
Preparation for the Short Exam	3	3	10
TOTAL WORKLOAD OF THE COURSE UNIT	**50**	**55**	**150**
Workload (h) / 25			**150÷25**
ECTS Credits allocated for the Course Unit			**6**

ANALOG ELECTRONICS FUNDAMENTALS Programme Course Description

CODE	NAME OF THE COURSE UNIT	SEMESTER	IN-CLASS HOURS (T+P)	CREDIT	ECTS CREDIT
CTE201	**Analog Electronics Fundamentals**	1	4	3	5

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit:	**Bachelor's Degree**
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Dr. Thabat F. Thabet**
Instructor(s) of the Course Unit	**Dr. Thabat F. Thabet**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	• To learn the basics of electronic devices. • Study the structure and the characteristics of electronic devices (diodes and transistors). • To learn the applications of diodes. • Study the principles of binary junction transistors (BJT).
Contents of the Course Unit:	1 – Introduction to electronics. 2 – Application of diodes 3 – Other types of diodes 4 – Transistors

Week	KEY LEARNING OUTCOMES OF THE COURSE UNIT On successful completion of this course unit, students/learners will or will be able to dealing with:
1	**1- <u>Introduction to electronics</u>.** Physics of material, atoms, electrons and energy bands, types of material (insulators, conductors, and semiconductors), N-type and P-type semiconductor.
2	**1- <u>Introduction to electronics</u>.** Diodes, forward bias, reverse bias, V-I characteristics.
3	**2- <u>Application of diodes</u>.** Half-wave rectifier, average value, r.m.s. value, capacitor filter, ripple voltage.
4	**2- <u>Application of diodes</u>.** Full-wave rectifier, average value, r.m.s. value, capacitor filter, ripple voltage.
5	**2- <u>Application of diodes</u>.** Diode limiters, output voltage signal.
6	**2- <u>Application of diodes</u>.** Clampers and Voltage Doubler.
7	**3- <u>Other types of diodes</u>.** Zener diodes, V-I characteristics
8	**3- <u>Other types of diodes</u>.** Voltage regulators using Zener diode (variable input voltage, and variable load).
9	**3- <u>Other types of diodes</u>.** Zener limiters
10	**3- <u>Other types of diodes</u>** Special purpose diodes, Varactor, Light Emitting diode LED, Photo diode, Schottky diode, Tunnel diodes.
11	**4- <u>Transistors</u>** Bipolar junction transistor BJT, current, voltages, and parameters, maximum ratings.
12	**4- <u>Transistors</u>** BJT biasing, cutoff, saturation, operating point.
13	**4- <u>Transistors</u>** Transistor bias circuits, base-bias, voltage divider
14	**4- <u>Transistors</u>** Transistor bias circuits, emitter-bias, collector-feedback..
15	**Final Exam.**

No.	Practical Part
1	**Lab 1:** Introduction to the Electronic Laboratory
2	**Lab 2:** Diode characteristics
3	**Lab 3**: Half-wave rectifiers
4	**Lab 4:** Full-wave rectifiers
5	**Lab 5:** Filter for Half-wave rectifiers
6	**Lab 6:** Filter for Full-wave rectifiers
7	**Lab 7:** Clipping Circuits
8	**Lab 8:** Clamper and Voltage Doubler
9	**Lab 9:** Zener diode characteristics
10	**Lab 10:** Voltage regulators using Zener diode
11	**Lab 11:** Transistor Characteristics
12	**Lab 12:** Transistor Biasing (part 1)
13	**Lab 13:** Transistor Biasing (part 2)
14	**Lab 14:** Review

Workload & ECTS Credits of The Course Unit :	**CTE201** Analog Electronics Fundamentals		
Workload For Learning & Teaching Activities			
Type of the Learning Activities	Learning Activities (# of week)	Duration (hours, h)	Workload (h)
Lecture & In-Class Activities	14	2	28
Preliminary & Further Study	2	2	4
Land Surveying	NA	NA	NA
Group Work	3	1	3
Laboratory	14	2	28
Reading	3	1	3
Assignment (Homework)	6	1	6
Project Work	1	3	3
Seminar	3	1	3
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	2	2	4
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	5	2	10
Final Exam	1	3	3
Preparation for the Final Exam	1	10	10
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	10	10
Short Exam (Quizzes)	4	0.5	2
Preparation for the Short Exam	4	1.5	6
Total Workload of the Course Unit	**65**	**44**	**125**
Workload (h) / 25			**125÷25**
ECTS Credits allocated for the Course Unit			**5**

OBJECT ORIENTED PROGRAMMING Programme Course Description

CODE	NAME OF THE COURSE UNIT	SEMESTER	IN-CLASS HOURS (T+P)	CREDIT	ECTS CREDIT
CTE202	**Object Oriented Programming**	1	4	3	5

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit:	**Bachelor's Degree**
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Dr. Anmar Burhan Mohammed Salih**
Instructor(s) of the Course Unit	**Dr. Anmar Burhan Mohammed Salih**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	To provide students with hands-on experience and practical skills to understand the theoretical parts of Introduction to C++ and OOP Basics.
Contents of the Course Unit:	1- Introduction to Object-Oriented Programming (OOP) 2- C++ Syntax and Basics 3- Classes and Objects 4- Inheritance and Polymorphism 5- Encapsulation and Data Hiding 6- Operator Overloading: 7- Templates 8- Exception Handling: 9- Advanced OOP Concepts

Week	KEY LEARNING OUTCOMES OF THE COURSE UNIT On successful completion of this course unit, students/learners will or will be able to dealing with:
1	Introduction to C++ and OOP Basics • Introduction to C++ programming language • Basic syntax, variables, and data types • Functions and control structures • Introduction to object-oriented programming (OOP) concepts: classes, objects, and methods
2	Classes and Objects • Defining and declaring classes • Creating objects and using constructors • Encapsulation and access modifiers (public, private, protected) • Member functions and data members
3	Inheritance and Polymorphism • Inheritance hierarchy and base/derived classes • Single inheritance and multiple inheritance • Polymorphism and function overriding • Abstract classes and pure virtual functions asses
4	Dynamic Memory Allocation and Pointers • Dynamic memory allocation with new and delete • Introduction to pointers and references • Memory management and deallocation • Object lifetime and scope
5	Operator Overloading • Overloading unary and binary operators • Overloading comparison and assignment operators • Friend functions and operator overloading • Best practices and guidelines for operator overloading
6	Templates and Generic Programming • Introduction to templates and generic programming • Function templates and class templates • Template specialization • Standard Template Library (STL) containers and algorithms

7	Exception Handling • Introduction to exception handling • try-catch blocks and handling exceptions • Throwing and catching exceptions • Exception specifications and best practices
8	• Midterm exam
9	File Handling and Streams • Input/output streams and file handling • Reading from and writing to files • Error handling and file status flags • Working with text and binary files
10	Advanced OOP Concepts • Polymorphism and virtual functions • Virtual base classes and diamond problem • Type casting and runtime type identification (RTTI) • Object slicing and dynamic casting
11	Standard Library Algorithms • Overview of the standard library algorithms • Sorting and searching algorithms • Numeric algorithms and iterators • Practical applications and usage examples
12	Memory Management • Smart pointers: unique_ptr, shared_ptr, weak_ptr • Memory management strategies and pitfalls • Resource Acquisition Is Initialization (RAII) • Memory leaks and debugging techniques
13	Namespaces and Organizing Code • Using namespaces for code organization • Creating and managing namespaces • Namespace conflicts and resolutions • Best practices for code modularization
14	Namespaces and Organizing Code • Using namespaces for code organization • Creating and managing namespaces • Namespace conflicts and resolutions • Best practices for code modularization
15	Final Exam

No.	PRACTICAL PART
1	**Lab 1:** Introduction to C++ • Basic syntax, variables, and data types•Functions and control structures
2	**Lab 2:** Classes and Objects • classes, objects, and methods document analysis
3	**Lab 3:** •Encapsulation and access modifiers (public, private, protected)•Member functions and data member
4	**Lab 4:** •Introduction to templates and generic programming •Function templates and class templates
5	**Lab 5:**•Template specialization •Standard Template Library (STL) containers and algorithms
6	**Lab 6:** •Introduction to exception handling • try-catch blocks and handling exceptions
7	**Lab 7:** •Introduction to exception handling • try-catch blocks and handling exceptions
8	**Lab 8:** Midterm
9	**Lab 9:** •OLID principles: Single Responsibility, Open-Closed, Liskov Substitution, Interface Segregation, Dependency Inversion
10	**Lab 10**: Design patterns: overview and examples
11	**Lab 11**: •Multithreading and concurrency in C++
12	**Lab 12**: **Assignment**
13	**Lab 13**: Applying design principles to real-world scenarios •Code refactoring and improvement
14	**Lab 14**: Review

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT :	CTE202	OBJECT ORIENTED PROGRAMMING	
WORKLOAD FOR LEARNING & TEACHING ACTIVITIES			
TYPE OF THE LEARNING ACTIVITIES	LEARNING ACTIVITIES (# OF WEEK)	DURATION (HOURS, H)	WORKLOAD (H)
Lecture & In-Class Activities	14	2	28
Preliminary & Further Study	2	2	4
Land Surveying	NA	NA	NA
Group Work	3	1	3
Laboratory	14	2	28
Reading	3	1	3
Assignment (Homework)	6	1	6
Project Work	1	3	3
Seminar	3	1	3
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	2	2	4
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	5	2	10
Final Exam	1	3	3
Preparation for the Final Exam	1	10	10
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	10	10
Short Exam (Quizzes)	4	0.5	2
Preparation for the Short Exam	4	1.5	6
TOTAL WORKLOAD OF THE COURSE UNIT	**65**	**44**	**125**
Workload (h) / 25			**125÷25**
ECTS Credits allocated for the Course Unit			**5**

APPLIED MATHEMATICS Course Description

CODE	NAME OF THE COURSE UNIT	SEMESTER	IN-CLASS HOURS (T+P)	CREDIT	ECTS CREDIT
CTE203	**Applied Mathematics**	1	3	3	4

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit:	**Bachelor's Degree**
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Ayhan Ahmed Khaleel**
Instructor(s) of the Course Unit	**Ayhan Ahmed Khaleel**

OBJECTIVES AND CONTENTS	Introduce students to mathematics through the laws and issues necessary for the purpose of assisting them in their studies in their field of specialization .
Objectives of the Course Unit:	To learn the
Contents of the Course Unit:	1- Matrices and systems of equations 2- Differential equations 3- Infinite Series

Week	KEY LEARNING OUTCOMES OF THE COURSE UNIT On successful completion of this course unit, students/learners will or will be able to dealing with:
1	Review of matrices and their properties
2	Complex matrices, Hermitian, skew-Hermitian and unitary matrices
3	Inverse matrices and elementary row operation
4	Gaussian and Gauss-Jordan elimination.
5	rank of a matrix
6	Eigen values and Eigenvectors.
7	First order differential equations, variable separable, homogeneous
8	linear first order and exact differential equations
9	Non-homogeneous second order with constant coefficients
10	Convergence and the Divergence tests-part1
11	Convergence and the Divergence tests-part2
12	Alternating series ,Absolute and conditional convergence
13	Power series
14	Taylor and Maclaurin series
15	**Final Exam**

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT :	CTE203	APPLIED MATHEMATICS	
WORKLOAD FOR LEARNING & TEACHING ACTIVITIES			
TYPE OF THE LEARNING ACTIVITES	LEARNING ACTIVITIES (# OF WEEK)	DURATION (HOURS, H)	WORKLOAD (H)
Lecture & In-Class Activities	**15**	**3**	**45**
Tutorial	**13**	**1**	**13**
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	NA	NA	NA
Reading	NA	NA	NA
Assignment (Homework)	4	1	4
Project Work	NA	NA	NA
Seminar	NA	NA	NA
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA
Final Exam	1	3	3
Preparation for the Final Exam	1	15	15
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	8	8
Short Exam (Quizzes)	4	0.5	2
Preparation for the Short Exam	4	2	8
TOTAL WORKLOAD OF THE COURSE UNIT	**44**	**34.5**	**100**
Workload (h) / 25			**100÷25**
ECTS Credits allocated for the Course Unit			**4**

DATA STRUCTURES Programme Course Description

CODE	NAME OF THE COURSE UNIT	SEMESTER	IN-CLASS HOURS (T+P)	CREDIT	ECTS CREDIT
CTE204	Data Structures	1	4	3	4

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit:	**Bachelor's Degree**
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Dr.Mohand L. Ahmed**
Instructor(s) of the Course Unit	**Dr.Mohand L. Ahmed**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	Provide the knowledge of basic data structures and their implementations, understand importance of data structures in context of writing efficient programs and develop skills to apply appropriate data structures in problem solving.
Contents of the Course Unit:	1- Introduction to the data structures and course objectives 2- Linear data structures 3- Algorithm Analysis. 4- Recursive and back tracking technique 5- Link list 6- Tree 7- Sorting algorithm

Week	KEY LEARNING OUTCOMES OF THE COURSE UNIT On successful completion of this course unit, students/learners will or will be able to dealing with:
1	**General introduction to data structures:** Introduce to the Basic types of Data Structures and the common algorithm
2	**Linear data structures:** What is linear data structure, characteristics of linear data structure and types of linear data structure.
3	**Algorithm Analysis:** Algorithm Analysis types and methods,experimental of analysis algorithm
4	**Recursion:** Introduction to recursion, some problems that solved by recursion and the difference between recursion and iteration
5	**Back tracking technique**: Introduction to back tracking technique ,general method of back tracking technique ,when to use a Backtracking algorithm and How does Backtracking work.
6	**Linked Lists**: Introduction linked lists data structures ,comparison between linked lists and array .
7	**Linked Lists**: basic operations on linked lists(Insertion, Deletion and traversing).
8	**Types of linked lists:** Doubly linked lists,circular linked lists,memory -efficient doubly linked list,unrolled linked lists
9	**Stacks:** What is a Stack,how stacks are used and stack applications and implementations.
10	**Queue:** What is queue ,how are queues used and queue exceptions and implementations
11	**Tree :** What is tree,binary trees and types of binary trees and properties of binary trees.
12	**Tree:** Binary tree traverals,generic trees(N-ary trees) and threaded binary tree traversals.
13	**Sorting algorith:** What is sorting ,why is sorting necessary and classification of sorting algorithms.
14	**Sorting algorith:** Classification of sorting algorithm types:bubble sort, selection sort, insertion sort,shell sort,merge sort ,quick sort and tree sort.
15	**Final Exam.**

No.	PRACTICAL PART
1	**Lab 1:** function declaration and function expression
2	**Lab 2:** pointer declaration and initialization.
3	**Lab 3**:user defined data structures
4	**Lab 4**: Implementation problems using iteration/recursion problems
5	**Lab 5**: implementation of back tracking method
6	**Lab 6:**how to define a linked list node and programming traversal operation.
7	**Lab 7:**programming a linked list insertion operation.
8	**Lab 8:** programming a linked list deletion operation.
9	**Lab 9:** Implementation of push and pop operation on stack
10	**Lab 10:** Programming some application using stack.
11	**Lab11:** Programming the queue to store some of data
12	**Lab 12:** Programming a storing data as tree structure and implementation of various traversal techniques
13	**Lab 13:** Programming a storing data as graph structure and implementation of various traversal technique
14	**Lab 14:** Programming a bubble sort, selection sort and insertion sort algorithms
15	**Lab 15:** Programming a shell sort,merge sort ,quick sort and tree sort algorithms

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT :	CTE204	DATA STRUCTURES	
WORKLOAD FOR LEARNING & TEACHING ACTIVITIES			
TYPE OF THE LEARNING ACTIVITIES	LEARNING ACTIVITIES (# OF WEEK)	DURATION (HOURS, H)	WORKLOAD (H)
Lecture & In-Class Activities	**15**	**2**	**30**
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	**14**	**2**	**28**
Reading	NA	NA	NA
Assignment (Homework)	**6**	**2**	**12**
Project Work	NA	NA	NA
Seminar	NA	NA	NA
Seminar Preparation	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	**5**	**1**	**5**
Final Exam	**1**	**3**	**3**
Preparation for the Final Exam	**1**	**6**	**6**
Mid-Term Exam	**1**	**2**	**2**
Preparation for the Mid-Term Exam	**1**	**3**	**3**
Short Exam (Quizzes)	**8**		
Preparation for the Short Exam	**8**	**0.5**	**4**
TOTAL WORKLOAD OF THE COURSE UNIT	**60**	**21.5**	**100**
Workload (h) / 25			**100÷25**
ECTS Credits allocated for the Course Unit			**4**

MEASUREMENTS & SENSORS Programme Course Description

CODE	NAME OF THE COURSE UNIT	SEMESTER	IN-CLASS HOURS (T+P)	CREDIT	ECTS CREDIT
CTE205	**Measurements & Sensors**	1	3	3	2

GENERAL INFORMATION	
Language of Instruction:	**English**
Level of the Course Unit:	**Bachelor's Degree**
Type of the Course:	**Compulsory**
Mode of Delivery of the Course Unit	**Face to Face**
Coordinator of the Course Unit	**Ahmed Waled Kasim**
Instructor(s) of the Course Unit	**Ahmed Waled Kasim**

OBJECTIVES AND CONTENTS	
Objectives of the Course Unit:	• Explain the basic working principle of various electronic measurement instruments used to measure electrical parameters like current, voltage, power etc. • Understand and describe the specifications, features, characteristics, error and the performance of an instrument. • Learn about various types AC bridges and their applications in measurements of capacitance, frequency, inductance etc. • Gain knowledge about the functional blocks of a CRO and do analysis, measurements of waveform display. • Explain working of various types of sensors, transducers and their applications.
Contents of the Course Unit:	• Definition of Measurements and Errors. As well as the types of errors. • Identify and design the Electromechanical Indicting Instruments both types DC and AC. • Studying the DC and AC Bridges as well as their Applications. • Introduction to Oscilloscopes. • Hall Effect Theory and its applications. • Introduction to Signal Generation. • Analogue and Digital Data Acquisition System. • Computer – Controlled Test System.

Week	KEY LEARNING OUTCOMES OF THE COURSE UNIT On successful completion of this course unit, students/learners will or will be able to dealing with:
1	**Measurement and Errors.**
2	**Electromechanical Indicting Instruments.**
3	**Electromechanical Indicting Instruments.**
4	**Electromechanical Indicting Instruments.**
5	**Bridges and their Applications.**
6	**Bridges and their Applications.**
7	**Oscilloscopes.**
8	**1- Theory of Hall Effect, Hall Effect Sensors, Basic Hall Effect Sensors.** **2- Analogue output Sensors.**
9	**Mid-Term Exam.**
10	**1- Digital output Sensors.** **2- Some Examples about Hall Effect Sensors.**
11	**Signal Generation.**
12	**Analogue and Digital Data Acquisition System.**
13	**Computer – Controlled Test System.**
14	**Preparatory Week.**
15	**Final Exam.**

No.	PRACTICAL PART
1	Lab1: Measurements of DC current.
2	Lab2: Measurements of DC voltage.
3	Lab 3: Loading effect on Voltmeter.
4	Lab 4: Series type Ohmmeter.
5	Lab 5: AC Voltmeter using half wave rectifier.
6	Lab 6: AC Voltmeter using full wave rectifier.
7	Lab 7: DC Bridges (Wheatstone bridge).
8	Lab 8: Comparison bridges.
9	Lab 9: Maxwell and Hay bridges.
10	Lab 10: Measurements of frequency.
11	Lab 11: Measurements of phase angle using Lissajous method.
12	Lab 12: Calibration of Thermocouple.
13	Lab 13: Photosensitive.
14	Lab 14: Review.

WORKLOAD & ECTS CREDITS OF THE COURSE UNIT :	CTE205	MEASUREMENTS & SENSORS	
WORKLOAD FOR LEARNING & TEACHING ACTIVITIES			
TYPE OF THE LEARNING ACTIVITIES	LEARNING ACTIVITIES (# OF WEEK)	DURATION (HOURS, H)	WORKLOAD (H)
Lecture & In-Class Activities	**15**	**1**	**15**
Preliminary & Further Study	NA	NA	NA
Land Surveying	NA	NA	NA
Group Work	NA	NA	NA
Laboratory	**14**	**1**	**14**
Reading	NA	NA	NA
Assignment (Homework)	3	1	3
Project Work	NA	NA	NA
Seminar	NA	NA	NA
Internship	NA	NA	NA
Technical Visit	NA	NA	NA
Web Based Learning	NA	NA	NA
Implementation/Application/Practice	NA	NA	NA
Practice at a workplace	NA	NA	NA
Occupational Activity	NA	NA	NA
Social Activity	NA	NA	NA
Thesis Work	NA	NA	NA
Field Study	NA	NA	NA
Report Writing	NA	NA	NA
Final Exam	**1**	**3**	**3**
Preparation for the Final Exam	1	8	8
Mid-Term Exam	1	2	2
Preparation for the Mid-Term Exam	1	4	4
Short Exam (Quizzes)	4		
Preparation for the Short Exam	4	1	1
TOTAL WORKLOAD OF THE COURSE UNIT	**34**	**21**	**50**
Workload (h) / 25			**50÷25**
ECTS Credits allocated for the Course Unit			**2**