Course Description Form

1. Course Name:
biosensor
2. Course Code:
WBM-52-08
3. Semester /
Year: second \ fifth year
4. Description Preparation Date:
19/3/2024
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
45 hours
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Lecturer :Mustafa Habib Email: mustafa.ha@uowa.edu.iq
8. Course Objectives

Course Objectives	• **1- Identify the basic parts of the medical sensor and how to manufact** • **2- How medical allergens develop over time** • **3- Knowing the types of medical allergens** • **4- Classification of medical allergens according to use** • **5- The purpose of using medical sensors with the human body**
9. Teaching and Learning Strategies	
Strategy	1- Theoretical lectures. Using the whiteboard and data sh 2- Discussion lectures Tutorials. 3- Practical experiments in laboratories. 4- Homework assignments.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method
First	3	Definition, characteristics, principles, and requirements.	Definition, characteristics, principles, and requirements.	theory
Second	3	Electrodes and definition	Electrodes and definition	theory
Third	3	electronic CCT and types.	electronic CCT and types.	theory
Fourth	3	Surface electrodes	Surface electrodes	theory
Fifth	3	Needle electrodes	Needle electrodes	theory
Sixth	3	Transducers and properties.	Transducers and properties.	theory
Seventh	3			theory
Eighth	3	Resistive transducers and thermometric transducers.	Resistive transducers and thermometric transducers.	theory
ninth	3	Medical applications	Medical applications	theory
tenth	3	Piezoelectric	Piezoelectric	theory
eleventh	3	ultrasound transducers	ultrasound transducers	theory
twelveth	3	Mechanical transducers, and medical applications.	Mechanical transducers, and medical applications.	theory
Thirteenth	3			theory
fourteenth	3	Chemical transducers and medical applications	Chemical transducers and medical applications	theory
fifteenth	3	pressure measurement transducers.	pressure measurement transducers.	theory

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily prep arati etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Wang, P., & Liu, Q. (201). Bio Business Media.
Main references (sources)	1- Wang, P., & Liu, Q. (2017 . Bio & Business Media. 2- Introduction to Biomedical l ngine
Recommended books and references (scientific journals, reports…)	Standard handbook of biomedical senso s
Electronic References, Websites	https://books.google.iq/books/about/Ha dbook

Course Description Form

1. Course Name
Neural networks
2. Course Code
WBM-52-05
3. Semester / Year
Quarterly
4. Date of preparation of this description
20/1/2025
5. Available attendance formats
Weekly (theoretical)
6. Number of Credit Hours (Total) / Total Number of Units
30 hours theoretical / 2 units
7. Course administrator name
Name: Dr. Saad Mahmoud Sarhan Email: saad.mah@uowa.edu.iq
8. Course Objectives

The subject of neural networks aims to acquire the following skills: 1. Creating a computing system that has the ability to simulate the human brain in solving problems. 2. The student should be able to organize and classify written data automatically. 3. Extract meaning from complex and inaccurate data. 4. Medical diagnosis by classifying medical images or signals. Know most of the engineering applications of the above vocabulary and how to benefit from them and employ them correctly in the field of biomedical engineering	**Course Objectives:**

9. Teaching and Learning Strategies
✓ The teacher gives detailed theoretical lectures ✓ The teacher requests periodic reports on the basic topics of the subject. ✓ The teacher is familiar with the basic concepts of neural networks of all kinds and practical applications, which enhances the method of learning and teaching. The teacher introduces students to the most important main applications of neural networks in the design of various medical devices theoretically and practically.

10. Course Structure

Evaluation method	Learning method	Unit or subject name	Required Learning Outcomes	Hours	Week
Daily tests + homework + monthly tests	Lectures presented in PDF format	Comparison of biological and artificial neurons	Comparison of the structure and functioning of biological neurons and artificial neurons	2	1
Daily tests + homework + monthly tests	Lectures presented in PDF format	Models of artificial neural systems	Overview of front grilles with examples	4	2-3
Daily tests + homework + monthly tests	Lectures presented in PDF format	Neuroprocessing, learning and adaptation	Explain neural processing mechanisms, learning methods, and coping techniques	4	4.5
Daily tests + homework + monthly tests	Lectures presented in PDF format	Data processing	Steps that include feature scale, normalization, feature selection, and optimization	2	6
Daily tests + homework + monthly tests	Lectures presented in PDF format	Performance measurement	Techniques such as the use of verification kits, training and testing, and cross-checking	4	7.8
Daily tests + homework + monthly tests	Lectures presented in PDF format	Workbooks	Explain and apply near-neighbor algorithms (KNN), linear differential analysis (LDA), and supporting vector machines (SVM)	8	9-12
Daily tests + homework + monthly tests	Lectures presented in PDF format	Learning rules	Overview of learning rules such as Hebbian, Perceptron, Delta, Winner, Correlation, and Out-star rule	4	13-14

Daily tests + homework + monthly tests	Lectures presented in PDF format	Medical Signals	Overview of the different types of medical signals and the challenges associated with their treatment	2	15

11. Course Evaluation

1- Daily exams with practical and scientific questions.

2- Participation scores for challenging competition questions among students.

3- Semester exams for the curriculum in addition to the mid-year exam and the final exam.

12. Learning and teaching resources

Neural networks and learning machines, third edition, Simon Haykin Neural networks theory, Alexander I. Galushkin	Required textbooks
• College library for additional curriculum resources. • View scientific websites to see the latest developments in the subject	Main references
All sober scientific journals related to artificial intelligence	Recommended books and references

Course Description Form

1. Course Name:
Computer Network
2. Course Code
WBM-52-05
3. Semester/Year:
Second Semester / Fifth Year
4. Date of preparation of this description:
19/3/2024
5. Available Attendance Forms:
Attend a lecture
6. Number of credit hours (total) / number of units (total):
2 hours / 60
7. Course administrator's name (if more than one name)
Name: Assistant Lecturer Fares Karim Email: Faris.kar@uowa.edu.iq
8. Course Objectives

Course Objectives Tuition	The article aims to show the means and methods contained in the computer network, where the article deals with explaining the means of communication and indicating their quality, efficiency, ways to improve their performance and the factors affecting them, and on the other hand, how to transfer data within the computer network and the methods and protocols used to transfer this data.

9. Teaching and learning strategies	
Strategy	B1 – To be able to know the methods of transmitting the signal and information through users and stations to transmit information B2 – To be able to design small networks and understand the mechanism of applying theoretical information in practical life

Course Structure

The week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
First	2	Understand the principles of networking and the workplaces of this important specialization in the areas of life	Types of computer Networks (clients server, Peer-to-peer,& Wireless networks) classifying the computer networks (Home network, LAN, MAN, WAN, Wireless Networks,& Internet work)	Using illustrative images and explaining the use of networks in areas of life	Daily exams +Homework + Monthly exams

Second		Understand how to communicate and how to transfer information	The Reference models [1. The OSI model (design issues for the layers, connection oriented & connectionless layers' services, Service Primitives, & The OSI Layers)]	Lectures displayed in PDF format	Daily exams +Homework + Monthly exams
Third			Wired LANs: Ethernet Wireless LANs : IEEE 802.11, Bluetooth	Lectures displayed in PDF format	Daily exams +Homework + Monthly exams
Fourth				Lectures displayed in PDF format	Daily exams + homework + monthly exams
V+ Sixth			The TCP/IP Model	Lectures displayed in PDF format	Daily exams + homework + monthly exams
VII + VIII			IP Addressing	Lectures displayed in PDF format	Daily exams + homework + monthly exams
Ninth+Tenth			Routers & Cisco IOS	Lectures displayed in PDF format	Daily exams + homework + monthly exams
Eleventh			Cisco IOS	Lectures displayed in PDF format	Daily exams + homework + monthly exams
Twelfth			Wireless WANs ,Cellular Telephone and Satellite Networks	Lectures displayed in PDF format	Daily exams + homework + monthly exams + homework + monthly exams
Thirteenth					
Fourteenth			Synchronous Optical Network Virtual-Circuit Networks	Lectures displayed in PDF format	Daily exams + homework + monthly exams + homework + monthly exams
Fifteenth					

. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily, oral, monthly, written exams, reports .... etc

. Learning and Teaching Resources

1- Required textbooks:	Computer Networking_ A Top-Down Approach -James Kurose Keith Ross-7th Edition 2017
2- Main references (sources)	ollege Library to obtain additional resources for the curriculum. iew the scientific websites to see the latest developments in the article.
A- Recommended books and references (scientific journals, reports,.....)	
B- Electronic References, Websites	1- https://www.netacad.com/

	2- https://mikrotik.com/training/academy 3- https://www.hawaiiacademy.com/

MODULE DESCRIPTION FORM

Module Name:	
Control systems II	
Module Code:	
WBM-52-04	
Semester / Year:	
second semester- 2025	
Date of Preparation of this Description:	
22-1-2025	
Available Attendance Formats:	
Class Attendance	
Total Credit Hours / Total Units:	
75 \ 3	
Name of the Course Coordinator (if there are multiple names):	
Qayssar Ayad Ahmed qayssar.ayad@uowa.edu.iq	
Module Objectives:	
Module Objectives	1- Building the student scientifically and qualifying him to understand the applications of digital control in some scientific and engineering fields, especially electrical and mechanical applications. 2- Building and preparing the student psychologically to play his role as a reliable engineer in this field. 3- Urging the student to be creative and think about specialization projects and keep pace with the development taking place in this field in terms of the basis of digital control in engineering work systems. 4- Identify the types of digital control and some of their practical applications.
1. **Teaching and Learning Strategy**	
Strategy:	The main strategy that will be adopted in developing the main features of this module to encourage student's participation in the exercises, while at the same time refining and expanding their critical thinking skill. This will be achieved through classes, interactive tutorials and by considering type of simple

	experiments involving some sampling activities that are interesting to the students. Building and preparing the student psychologically to play his role as an engineer.

2. Module Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	6	Introduction to digital engineering control systems and methods of representing systems	Introduction to Discrete-Time Control System. Review of Mathematical Foundation.	Lectures DATA SHOW	Surprise exams and classroom activities
3-4	6	Analysis of digital control systems and design of a traditional digital controller	Analysis of Discrete-Time Systems. Design of Conventional Discrete-Time Controllers.	Lectures DATA SHOW	Surprise exams and classroom activities
5-6	6	Introduction to theory state space	State-space modeling	Lectures DATA SHOW	Surprise exams and classroom activities
7-8	6	How to analyze using the method (controllability and observability)	controllability and observability	Lectures DATA SHOW	Surprise exams and classroom activities
9-10	6	the definition, z-transform And analysis methods	Sampling theorem Z-transform	Lectures DATA SHOW	Surprise exams and classroom activities
11-12	6	How to design a digital controller using state-space method	Design of digital control systems using state-space methods	Lectures DATA SHOW	Surprise exams and classroom activities
13-14	6	Recognition digital PID controllers	Digital PID controllers and tuning	Lectures DATA SHOW	Surprise exams and classroom activities
Module Evaluation					
Quizzes (4%), Assignment (3%), lab. (10%), attendance (3%), Mid exam (30%), FINAL exam (50%)					

Learning and Teaching Resources.	
Required textbooks (curricular books, if any)	1- Modern Control Engineering, (5th Edition) By: Katsuhiko Ogata. Mechanical Engineering, University of Minnesota. 2- Control Systems Engineering, (6th Edition) By: Norman S. Nise. Electrical and Computer Engineering Department at California State Polytechnic University.
Main references (sources)	Modern Control Engineering, (5th Edition)
Recommended books and references (scientific journals, reports...)	1- Internet files. 2- All solid scientific journals and sites that are related to the broad concept of engineering control
Electronic References, Websites	Tracking Scientific websites to view recent developments in the prescribed subject For fifth year students.

Course Description Form

1. Course Name:
Electromechanical Design
2. Course Code:
WBM-52-03
3. Semester / Year:
Semester
4. Description Preparation Date:
19/3/2024
5. Available Attendance Forms:
Presence in the classroom
6. Number of Credit Hours (Total) / Number of Units (Total)
45 h/ 2 units
7. Course administrator's name (mention all, if more than one name)
Name: Hussain Ameer Aljawad Email: Hussein.aljawad@uowa.edu.iq
8. Course Objectives

Course Objectives	Microelectromechanical systems (MEMS), such as pressure sensors, accelerometers, and bio-mechanical assemblies and displays, require knowledge of a broad range of disciplines, from microfabrication to mechanics to electromechanical. This subject presents an introduction to this broad field, using examples and design projects drawn from real MEMS and Bio-MEMS applications. Learn about MEMS components, including microsensors and microactuators. In addition to its most important applications in the biomedical fields. Knowledge of the most important materials used in the design and micromanufacturing of microsystems, including basic and auxiliary materials.

9. Teaching and Learning Strategies	
Strategy	1- Knowledge of the basics of electromechanical design 2- Knowledge of applications of medical and bio-electromechanical systems 3- Knowing the most important materials used in manufacturing and their properties 4- Study the most important methods of precision manufacturing 5- Knowing the types of sensors and micro-actuators

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	3	Introduction to Electromechanical systems	Introduction to Electromechanical systems , classifications the systems, Introduction to Miro-Electromechanical systems	Presented the lectures and explain it.	Daily exams + classwork
2	3	MEMS components	(microstructures, microsensors, microactuators). (MEMS Advantages). (Ghallenge of MEMS Design). And Bio-MEMS.	Presented the lectures and explain it.	Daily exams + classwork
3+4	3	MEMS materials	Silicon and Other Compound Materials, Silicon Oxide and Silicon Nitride, Quartz, Glass, and Sapphire. metals, ceramic, polymer	Presented the lectures and explain it.	Daily exams + classwork
5-7	3	Microfabrication	Microfabrication (Bulk: Wet etching and Dry etching, LIGA process, Deposition techniques).	Presented the lectures and explain it.	Daily exams + classwork
8	3	Microfluidics	Introduction to Microfluidics, the continuity equation, surface tension in liquid	Presented the lectures and explain it.	Daily exams + classwork
9-11	3	Transducers	Transport processes, Biosensors, MEMS Actuators	Presented the lectures and explain it.	Daily exams + classwork

12-15	3	Bio-MEMS	Bio-MEMS (Surgical application, MEMS in drug Delivery system (micro-pump), bioelectric interfaces, MEMS based diagnostics)	Presented the lectures and explain it.	Daily exams + classwork

11. Course Evaluation

1- Theoretical lectures.
2- Discussion Tutorials.
3- Application in group design to activate the team spirit at work

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The MEMS Handbook MEMS Design (2nd Ed) - M. Gad el Hak
Main references (sources)	The Science & Engineering of Microelectronic Fabrication by S. A. Campbell, Oxford
Recommended books and references (scientific journals, reports…)	https://www.nature.com/micronano
Electronic References, Websites	

Course Description Form

1. Course Name:
Hospital systems and design
2. Course Code:
WBM-51-07
3. Semester / Year:
Semester 1(2024−2025)
4. Description Preparation Date:
2024−09−19
5. Available Attendance Forms:
presence in the classroom
6. Number of Credit Hours (Total) / Number of Units (Total)
30 Hours / 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Marwan Shibein Email: marwan.sh@uowa.edu.iq
8. Course Objectives

Course Objectives	To increase student knowledge in the field of designing hospitals and recent trends associated with developing hospitals concerning general and specialized buildings, gardens, waiting areas, traffic routes, ventilation system, safety, etc… To enable him from dealing with different future modifications about adding additional departments or medical devices.
9. Teaching and Learning Strategies	
Strategy	1- Making the student able to demonstrate real knowledge of hospital systems and design concepts during the academic level and their applications. 2- Learn the fundamental hospital departments and their size, medical devices included, ventilation requirements, sterilization procedures, etc. 3- Learn and understand modern solution methods in modification cases.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1 +2+3	4	Introduction	Defining the hospital, the Perspective of the Patient, Healthcare as a Public Service, Th Business Case for Hospitals, Changing Healthcare Needs.	Lectures presented PDF format	Daily exams + homework assignments + monthly exams
4+5+6	4	DESIGNING HOSPITALS:	Distribution of Healthcare Facilities: Centralization, Decentralization and the Network Hospital, The Design of Hospitals: Care Pathways, Processes and Spaces: The Example of the Maternity Department, Evidence-Based Design for Healing Environments, The Building Type and its Emergence.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
6+7	4	Limits and continuity	Limits: Introduction, limits found numerically and Algebraically, examples. Continuity: Introduction, Examples Evaluating limits at a point: introduction, Examples. Infinite limits: Introduction , Examples.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
8+9	4	PUBLIC SPACES	Zoning and Traffic System, Arrival and Entrance, Public Spaces in and Around the Hospital: Streets, Squares, Patios, Waiting Areas, Healing Gardens, Way finding: Signage and Orientation Systems	Lectures presented in PDF format	Daily exams homework assignments monthly exams
10 +11	4	TREATMENT AREAS	Planning: an Integral Approach, Outpatient Department, Inpatient Wards, Diagnostic Imaging, Operating Theater and Recovery Area, Intensive Care Unit, Emergency Department, Laboratory Department.	Lectures presented in PDF format	Daily exams homework assignments monthly
12	4	GENERAL HOSPITALS	Circle Bath, Butaro District Hospital Butaro, Rwanda MASS Design Group, Private	Lectures presented in PDF format	Daily exams homework assignments

		Part 1	Hospital, Lille, France Jean-Philippe Pargade Architectes, Extension Kolding Hospital Kolding, Denmark Schmidt Hammer Lassen Architects, AZ Groeninge Kortrijk, Belgium Baumschlager Eberle Architekten Zaans Medisch Centrum.		monthly
13	4	GENERAL HOSPITALS Part 2	Hôpital Riviera-Chablais, Medisch Spectrum Twente Enschede, Rey Juan Carlos Hospital, Meander Medisch Centrum, Cleveland Clinic Abu Dhabi.	Lectures presented in PDF format	Daily exams homework assignments monthly
14	4	CHILDREN'S HOSPITALS	Nemours Children's Hospital, Randall Children's Hospital, Juliana Children's Hospital, Mother-Child and Surgical Center, Children's Hospital, Royal Children's Hospital.	Lectures presented in PDF format	Daily exams homework assignments monthly
15	4	UNIVERSITY HOSPITALS	Center for Surgical Medicine, University Hospital, Düsseldorf , St. Olav's Hospital, Akershus University Hospital, Reconstruction of the Johann Wolfgang Goethe University Hospital, Erasmus MC Hospital and Education Center	Lectures presented in PDF format	Daily exams homework assignments monthly

11. Course Evaluation

- Daily exams with practical and scientific questions.
- Participation scores for difficult competition questions among students
- Establishing grades for environmental duties and the reports assigned to them
- Semester exams for the curriculum, in addition to the mid-year exam and final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Hospital_Design_Guide_How_to_get_started
Main references (sources)	• College library to obtain additional sources for academic curricula • Check scientific websites to see rec developments in the subject
Recommended books and references (scientific journals, reports…)	All reputable scientific journals that are related the broad concept of designing hospitals and th results

Course Description Form

1. Course Name:
Image Processing
2. Course Code:
WBM-51-05
3. Semester / Year:
Semester
4. Description Preparation Date:
2024−03−19
5. Available Attendance Forms:
presence in the classroom
6. Number of Credit Hours (Total) / Number of Units (Total)
60 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Faris Kaream Helwat Email: faris.kaream@uowa.edu.iq

8. Course Objectives	
Course Objectives	**This course focuses on image processing and computer vision focuses on studying methods that allow a machine to learn and analyze images and video using geometry and statistical learning. The recent growth of digital imaging technologies, hardware advances, and machine learning models has led to many exciting recent developments in the field of image and video analytics. This course covers a range of topics, starting from the basics of image formation and processing to recent deep learning methods addressing**

9. Teaching and Learning Strategies	
Strategy	1- recognize the image and understanding of the content and the relationship between the location and color value and sorts images according to these color values from black and white images and ending with natural colors. 2-identify the source of the image and representation and formats stage before finishing out as a file in storage unit 3- understand the relationship between image points and how to configure entity within the image and demonstrate chromatography interdependence and on-site 4-discussed ways to enlarge and reduce the image and application of a set of algorithms necessary

	5- touched on the various filters that manipulate the values of the point and leave the various changes to the image 6- addressed to the frequency domain and the spatial domain and how apply filters 7- operations of the histogram, edge, segmentation, restoration, erosion and dolation, and others.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction		Lectures present in PDF format	Daily exams + homework assignments + monthly exams
2	4	Human visual system. Sources of Digital Images, Simultaneous contrast. Optical illusions. Image acquisition.		Lectures presented in PDF format	Daily exams homework assignments monthly exam
3	4	Image formation model. Image sampling and quantization.		Lectures presented in PDF format	Daily exams homework assignments monthly exam
4	4	Representing digital images. Spatial and intensity resolution.		Lectures presented in PDF format	Daily exams homework assignments monthly exam
5	4	Image file format. Basic relationships between pixels. Distance measures.		Lectures presented in PDF format	Daily exams homework assignments monthly
6	4	Distance measures. Point operations. Arithmetic operations Set		Lectures presented in PDF format	Daily exams homework assignments monthly

		and logical operations.			
7	4	First mid teams		Lectures presented in PDF format	Daily exams homework assignments monthly
8	4	Set and logical operations. Spatial domain. Processes on spatial domain.		Lectures presented in PDF format	Daily exams homework assignments monthly
9	4	Basic intensity transformation functions.		Lectures presented in PDF format	Daily exams homework assignments monthly
10	4	Piecewise-linear transformation functions. Histograms. Histogram processing. Histogram equalization.		Lectures presented in PDF format	Daily exams homework assignments monthly
11	4	What is a spatial filter? The mechanics of linear spatial filtering. Correlation and convolution. Smoothing spatial filters (linear and nonlinear). Sharpening spatial filters characteristics Foundation of sharpening filters. Laplacian filter		Lectures presented in PDF format	Daily exams homework assignments monthly

12	4	**Second mid teams**		Lectures presented in PDF format	Daily exams homework assignments monthly
13	4	**Image Segmentation, Application of image segmentation, Point Detection, Line Detection, Edge detection, Sobel Edge detection, Prewitt Edge detection**		Lectures presented in PDF format	Daily exams homework assignments monthly
14	4	**Image Compression, Image Compression System, Compression type, Huffman Coding, Lossy compression**		Lectures presented in PDF format	Daily exams homework assignments monthly
15	4	**Color Image Processing, Color Models, Converting colors between model**		Lectures presented in PDF format	Daily exams homework assignments monthly

11. Course Evaluation

- Daily exams with practical and scientific questions.
- Participation scores for difficult competition questions among students
- Establishing grades for environmental duties and the reports assigned to them
- Semester exams for the curriculum, in addition to the mid-year exam and final exam

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Digital Image Processing -Gonzales R Woods R.E. 4th ed., 2018.
Main references (sources)	- Digital Image Processing using SCILAB, Ro M. Thanki • Ashish M. Kothari, 2019. - Digital Image Processing Using MATLA Gonzalez R.C., Woods R.E., and Eddins S., 3 ed., 2020.
Recommended books and references (scientific journals, reports…)	All reputable scientific journals that a related to the broad concept of mathemati theories and their results

Course description form

1. Course Name: Control II
2. Course Code: WBM-52-04
3. Semester/Year: Second/2023-2024
4. Date this description was prepared: 03/20/2024
5. Available forms of attendance: Weekly attendance - theoretical hall + practical laboratory
6. Number of study hours (total)/number of units (total): 90 hours/semester (3 theoretical hours per week + 3 practical hours)/3 units
7. Name of the course administrator (if more than one name is mentioned)
the name: Asst. Lecturer qaysar Ayad Email:qaysar.ayad@uowa.edu.iq ‘

8. Course objectives	
Objectives of the study subject	• Building the student scientifically and qualifying him to understand the applications of digital contr in some scientific and engineering fields, especiall electrical and mechanical applications. • Building and preparing the student psychologically to play his role as a reliable engineer in this field. • Urging the student to be creative and think about specialization projects and keep pace with the development taking place i this field in terms of the bas of digital control in engineering work systems. • Identify the types of digital control and some of their practical applications
9. Teaching and learning strategies	

strategy	1-The methodical book, as well as lectures and solvi mathematical problems. 2-Scientific library. 3- Visual presentation methods (data show) using t PowerPoint program or displaying PDF files to clar the lecture items, drawings and shapes. 4-Useful educational sites on the Internet. 5The teacher delivers detailed theoretical lectures, a students participate during the lecture in solving so engineering problems. 6- Adopting the homework method to solve t exercises by students. 7- The teacher is familiar with the basic concepts engineering control techniques and their scienti applications, which enhances the method of learni and teaching.

10. Course structure

Evaluation method	Learning method	Name of the unit or topic	Required learning outcomes	hours	the week
Surprise exams and classroom activities	Lectures DATA SHOW	Introduction to Discrete-Time Control System. Review of Mathematical Foundation.	Introduction to digital engineering control systems and methods of representing systems	6	1-2
Surprise exams and classroom activities	Lectures DATA SHOW	Analysis of Discrete-Time Systems. Design of Conventional Discrete-Time Controllers.	Analysis of digital control systems and design of a traditional digital controller	6	3-4
Surprise exams and classroom activities	Lectures DATA SHOW	State-space modeling	Introduction to theory state space	6	5-6
Surprise exams and classroom activities	Lectures DATA SHOW	controllability and observability	How to analyze using the method (controllability and observability)	6	7-8

Surprise exams and classroom activities	Lectures DATA SHOW	Sampling theorem Z-transform	the definition, z-transform And analysis methods	6	9-10
Surprise exams and classroom activities	Lectures DATA SHOW	Design of digital control systems using state-space methods	How to design a digital controller using state-space methods	6	11-12
Surprise exams and classroom activities	Lectures DATA SHOW	Digital PID controllers and tuning	Recognition digital PID controllers	6	13-14

11. Course evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as daily preparation, daily, oral, monthly, written exams, reports, etc.

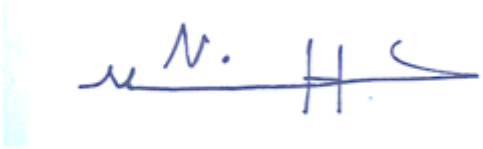
- Attendance + cup = 10%
- Monthly exam = 30%
- Practical laboratory = 10%
- Final exam = 50%
- Final total = 100%

12. Learning and teaching resources

1.Modern Control Engineering, (5th Edition) By: Katsuhiko Ogata. Mechanical Engineering, University of Minnesota	Required prescribed books
2.Control Systems Engineering, (6th Edition) By: Norman S. Nise. Electrical and Computer Engineering Department at California State Polytechnic University	Main references (sources)
-Internet files. -All solid scientific journals and sites that are related to the broad concept of engineering control	Recommended books and references (Scientific journals, reports,)

tracking Scientific websites to view recent developments in the prescribed subject For fifth year students.	Electronic references, Internet sites...

إسم التدريسي: م.م. حارث نوفل عبدعلي

التوقيع: 

التاريخ: 2024/3/20

Course Description Form

1. Course Name:
Diagnostic Instrumentation
2. Course Code:
WBM-51-03
3. Semester / Year:
1st Semester / 2023 2024
4. Description Preparation Date:
19/3/2024
5. Available Attendance Forms:
Weekly (Theoretical & Practical)
6. Number of Credit Hours (Total) / Number of Units (Total)
45 Hrs. Theoretical & 30 Hrs. Practical / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Hayder A. Yousif Email: hayder.ab@uowa.edu.iq
8. Course Objectives

Course Objectives	The main aim of this study is studying some diagnostic devices that are related to the human body (such as the sonar device, the medical endoscope device, and the vital activity monitoring device) and study the principle working with its effect on the human body. In this course the student will study the Diagnostic Instrumentation (Medical Ultrasound, Endoscopy, and Patient Alarm Systems) The student will be able to know the following: 1- The properties of ultrasound waves. The decibel notation for ultrasound intensity and pressure. The ultrasound properties of velocity, attenuation, and absorption. The ultrasound reflection, refraction and scattering, and principle working of ultrasound device.

	2- Basic component of Endoscopy, Principle working of Endoscopy, and Types of Endoscopies.

9. Teaching and Learning Strategies

Strategy	The student will be able to understand the principle of operation of the Diagnostic Instrumentation and its dealings with the human body, and to graduate engineers specialized in the field of biomedical engineering, which relates to human life with the medical device and work in the medical engineering environment.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Studying the principle working of ultrasound device	Introduction to Medical Ultrasound	Theoretical & Practical	Daily test and oral questions
2	3	Learn about ultrasound transducers	Ultrasound Transducers	Theoretical & Practical	Daily test and oral questions
3	3	Learn about sonar imaging systems	Ultrasound Imaging Mode System	Theoretical & Practical	Daily test and oral questions
5&4	3	Learn about sonar imaging systems	Basic Modes of Transmission of Ultrasound	Theoretical & Practical	Daily test and oral questions
6	3	Introduction to the laparoscopic medical device	Introduction to Endoscopy	Theoretical & Practical	Daily test and oral questions
7	3	Learn about the basics of fibers in medical endoscopy	Basic Optics in Endoscopy	Theoretical & Practical	Daily test and oral questions
8	3	Identify the lighting sources used	Light Source	Theoretical & Practical	Daily test and oral questions
10&9	3	Knowing the types of endoscopies	Types of Endoscopies	Theoretical & Practical	Daily test and oral questions
11	3	Introduction to patient monitoring device	Introduction to Patient monitoring systems	Theoretical & Practical	Daily test and oral questions

12 13&	3	Knowledge of heart rate measurement and monitoring	Measurement of Heart Rate	Theoretical & Practical	Daily test and oral questions
& 14 15	3	Learn how to monitor a patient's blood pressure in the intensive care room	Pressure Monitoring	Theoretical & Practical	Daily test and oral questions

11. Course Evaluation

1- Weekly exams
2- Monthly exams
3- Participations inside the class
4-present the seminars
5- Writing reports

12. Learning and Teaching Resources

Required textbooks (curricular books any)	Handbook of Biomedical Instrumentation Second Edition - R S KHANDPUR
Main references (sources)	Handbook Of Biomedical Instrumentation 3rd Edition 933920543X · 9789339205430 By R S Khandpur
Recommended books and references (scientific journals, reports…)	Standard handbook of biomedical engineering & design - M Kutz
Electronic References, Websites	https://books.google.iq/books/about/Handbook of_Biomedical_Instrumentation.html?idesc=y

Course Description Form of Infrared and Thermal Imaging

1. Course Name:
Infrared and Thermal Imaging
2. Course Code:
WBM−51−02
3. Semester / Year:
Semester 1/2023
4. Description Preparation Date:
2024−03−20
5. Available Attendance Forms:
presence in the classroom
6. Number of Credit Hours (Total) / Number of Units (Total)
30 Hours / 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Maryam Abdullah Saib Email: Mayram.ab@uowa.edu.iq
8. Course Objectives

Course Objectives	• Infrared thermal imaging aims to identify the technology of generating quantitative radiometric digital images of object scenes recorded at infrared thermal wavelengths. Besides qualitative visualization as well, it allows measuring the surface temperatures of objects.

9. Teaching and Learning Strategies

Strategy	• Giving detailed theoretical lectures. • Request periodic reports on the basic topics of the subject.

10. Course Structure

Week	Hours	Unit or subject name	Learning method	Evaluation method
1, 2	4	Introduction: Infrared and Thermal Imaging, History of IR, General Definition Of Thermography, Principle Used In Thermography, Thermal Imaging Cameras, History Of Electromagnetic Waves. Electromagnetic Waves and the Electromagnetic Spectrum, Nature of electromagnetic Waves, Radio Waves, Micro Waves, Infrared Waves, Visible	Lectures presented in PDF format	Daily exams + homework assignments + monthly exams

		Light, Ultra violet, X-rays, Gamma Rays.		
3, 4	4	Basics of Geometrical Optics for Infrared Radiation, Behavior of Waves, Reflection, Refraction, Interference, Diffraction, Laws of Reflection and Refraction, Reflection of Light from Optical Surface, Smooth Surface Reflection, Rough Surface Reflection, Reflection Index, Snell's Law, Refraction in Prism. Basic Radiometry, Radiant Power, Excitance, Irradiance, Spectral Densities of Radiometric Quantities, Radiant intensity, Radiance and Lambertian Emitter, Radiation Transfer between surfaces.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
5, 6, 7	6	Blackbody Radiation, Blackbody Radiation Definition, Planck Distribution Function for Blackbody Radiation, Different Representations of Planck's Law, Stefan–Boltzmann Law, Band Emission. Emissivity definition, Classification of Objects According to Emissivity, Emissivity and Kirchhoff 's Law, Parameters Affecting the Value of Emissivity. Instruments Overview, Introduction and Classification of Instruments, Instrument Manufacturers, Discussion of Instruments, Infrared thermocouples and probes, Portable hand-held instruments, Infrared cameras (thermal imagers).	Lectures presented in PDF format	Daily exams homework assignments monthly exams
8	2	Diagnostic Thermal Image-Processing Capabilities, Quantitative Thermal Measurements of Targets, Detailed Processing and Image Diagnostics, Image Recording, Storage and Recovery, Image Comparison, Thermal Image Fusion, Report and Database Preparation.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
9	2	Camera Systems, Standards, and Calibration, The Imaging System,	Lectures presente	Daily exams homework

		Temperature Reference, Mounting the Imager, Camera Initialization, Patient Position and Image Capture, Location for Thermal Imaging, Ambient Temperature Control, Pre-Imaging Equilibration, Positions for Imaging, Field of View.	d in PDF format	assignments monthly
10	2	Usage of IR-based technologies in medical applications: Screening of breast cancer, Screening of diabetic neuropathy and vascular disorders.	Lectures presente d in PDF format	Daily exams homework assignments monthly
11	2	Usage of IR-based technologies in medical applications: Usage in Raynaud's phenomenon, Usage for body temperature monitoring.	Lectures presente d in PDF format	Daily exams homework assignments monthly
12	2	Usage of IR-based technologies in medical applications: Usage for diagnosis of skin diseases, Usage for diagnosis of rheumatic diseases.	Lectures presente d in PDF format	Daily exams homework assignments monthly
13	2	Usage of IR-based Technologies in Medical Applications Usage for Diagnosis of Ocular Diseases, Usage for Diagnosis of Pain.	Lectures presente d in PDF format	Daily exams homework assignments monthly
14	2	Why use Thermal Imaging Cameras, Infrared Thermometers - Thermal Imaging Cameras, Finding Problems Faster and with Extreme Accuracy, Use Thousands of Infrared Thermometers at the Same Time.	Lectures presente d in PDF format	Daily exams homework assignments monthly
15	2	Camera Types, Thermal Detector Types, The lens.	Lectures presente d in PDF format	Daily exams homework assignments monthly

11. Course Evaluation

- Daily exams scientific questions.
- Establishing grades for environmental duties and the reports assigned to them.
- Semester exams for the curriculum, in addition to the mid-year exam and final exam

12. Learning and Teaching Resources

1. Practical applications of infrared thermal sensing and imaging equipment / by Herbert Kaplan. — 3rd ed.
2. Infrared Thermal Imaging Fundamentals, Research and Applications/ Michael n and Klaus-Peter M¨ollmann

Course Description Form of Infrared and Thermal Imaging

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Infrared and Thermal Imaging
2. Course Code:
WBM−51−02
3. Semester / Year:
Semester 1/2023
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Name: Maryam Abdullah Saib Email: Mayram.ab@uowa.edu.iq
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9. Teaching and Learning Strategies

Strategy	• Giving detailed theoretical lectures. • Request periodic reports on the basic topics of the subject.

10. Course Structure

Week	Hours	Unit or subject name	Learning method	Evaluation method
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5, 6, 7	6	Blackbody Radiation, Blackbody Radiation Definition, Planck Distribution Function for Blackbody Radiation, Different Representations of Planck's Law, Stefan–Boltzmann Law, Band Emission. Emissivity definition, Classification of Objects According to Emissivity, Emissivity and Kirchhoff 's Law, Parameters Affecting the Value of Emissivity. Instruments Overview, Introduction and Classification of Instruments, Instrument Manufacturers, Discussion of Instruments, Infrared thermocouples and probes, Portable hand-held instruments, Infrared cameras (thermal imagers).	Lectures presented in PDF format	Daily exams homework assignments monthly exams
8	2	Diagnostic Thermal Image-Processing Capabilities, Quantitative Thermal Measurements of Targets, Detailed Processing and Image Diagnostics, Image Recording, Storage and Recovery, Image Comparison, Thermal Image Fusion, Report and Database Preparation.	Lectures presented in PDF format	Daily exams homework assignments monthly exams
9	2	Camera Systems, Standards, and Calibration, The Imaging System,	Lectures presente	Daily exams homework

		Temperature Reference, Mounting the Imager, Camera Initialization, Patient Position and Image Capture, Location for Thermal Imaging, Ambient Temperature Control, Pre-Imaging Equilibration, Positions for Imaging, Field of View.	d in PDF format	assignments monthly
10	2	Usage of IR-based technologies in medical applications: Screening of breast cancer, Screening of diabetic neuropathy and vascular disorders.	Lectures presente d in PDF format	Daily exams homework assignments monthly
11	2	Usage of IR-based technologies in medical applications: Usage in Raynaud's phenomenon, Usage for body temperature monitoring.	Lectures presente d in PDF format	Daily exams homework assignments monthly
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13	2	Usage of IR-based Technologies in Medical Applications Usage for Diagnosis of Ocular Diseases, Usage for Diagnosis of Pain.	Lectures presente d in PDF format	Daily exams homework assignments monthly
14	2	Why use Thermal Imaging Cameras, Infrared Thermometers - Thermal Imaging Cameras, Finding Problems Faster and with Extreme Accuracy, Use Thousands of Infrared Thermometers at the Same Time.	Lectures presente d in PDF format	Daily exams homework assignments monthly
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2. Infrared Thermal Imaging Fundamentals, Research and Applications/ Michael n and Klaus-Peter M¨ollmann

Course Description Form

1. Course Name:

Bio–Tribology

2. Course Code:

WBM-52-06 / BioTribology

3. Semester / Year:

Semester 2

4. Description Preparation Date:

2025

5. Available Attendance Forms:

Weekly / theoretical

6. Number of Credit Hours (Total) / Number of Units (Total)

26/2

7. Course administrator's name (mention all, if more than one name)

Name: Lec. Natiq Aziz Omran
Email:

8. Course Objectives

Course Objectives	• To introduce students to Bio tribology and its multiple applications. • To differentiate between surface types and their interaction modes. • To justify the choice of materials used in implants and prosthetics. • To calculate friction and lubrication values for various surfaces. • To evaluate the quality and suitability of prosthetics for users.

9. Teaching and Learning Strategies

Strategy	• Textbooks and lectures. • Detailed theoretical lectures by the instructor. • Student participation in solving applied problems during lectures. • Use of blended e-learning methods.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Student understands the lecture	Introduction to Bio tribology	Theoretical lecture	Daily Quiz + Discussion
2	2	Student understands the lecture	Types of Surfaces	Theoretical lecture	Daily Quiz Discussion
3	2	Student understands the lecture	Friction Calculations	Theoretical lecture	Daily Quiz Discussion
4	2	Student understands the lecture	Types of Friction	Theoretical lecture	Daily Quiz Discussion
5	2	Student understands the lecture	Laws of Static and Dynamic Friction	Theoretical lecture	Daily Quiz Discussion
6	2	Student understands the lecture	Theories and Types of Wear	Theoretical lecture	Daily Quiz Discussion
7	2	Student understands the lecture	Wear Measurements	Theoretical lecture	Daily Quiz Discussion
8	2	Student understands the lecture	Friction and Wear Measurement	Theoretical lecture	Daily Quiz Discussion
9	2	Student understands the lecture	Lubrication Mechanism	Theoretical lecture	Daily Quiz Discussion
10	2	Student understands the lecture	Hydrodynamic Lubrication	Theoretical lecture	Daily Quiz Discussion

11	2	Student understands the lecture	Elastic Hydrodynamic Lubrication	Theoretical lecture	Daily Quiz Discussion
12	2	Student understands the lecture	Human Joints	Theoretical lecture	Daily Quiz Discussion
13	2	Student understands the lecture	Lubrication of Human Joints	Theoretical lecture	Daily Quiz Discussion
14	2	Student understands the lecture	Bio tribology of Artificial Joints	Theoretical lecture	Daily Quiz Discussion
15	2	Student understands the lecture	Lubrication of Artificial Joints	Theoretical lecture	Daily Quiz Discussion

11. Course Evaluation

Mid exam	25%
Participation , assignments, presentation,	15%
Final exam	60%
`total	100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Biotribology by J. Paulo Davim, 2013
Main references (sources)	Biotribology by J. Paulo Davim, 2013
Recommended books and references (scientific journals, reports…)	Journal of Biotribology, ISSN 2352-5738
Electronic References, Websites	Websites of companies manufacturi medical implants and prosthetics

Course Description Form

1. Course Name:

Bio–Tribology

2. Course Code:

WBM-52-06 / BioTribology

3. Semester / Year:

Semester 2

4. Description Preparation Date:

2025

5. Available Attendance Forms:

Weekly / theoretical

6. Number of Credit Hours (Total) / Number of Units (Total)

26/2

7. Course administrator's name (mention all, if more than one name)

Name: Lec. Natiq Aziz Omran
Email:

8. Course Objectives

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9. Teaching and Learning Strategies

Strategy	• Textbooks and lectures. • Detailed theoretical lectures by the instructor. • Student participation in solving applied problems during lectures. • Use of blended e-learning methods.

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Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
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8	2	Student understands the lecture	Friction and Wear Measurement	Theoretical lecture	Daily Quiz Discussion
9	2	Student understands the lecture	Lubrication Mechanism	Theoretical lecture	Daily Quiz Discussion
10	2	Student understands the lecture	Hydrodynamic Lubrication	Theoretical lecture	Daily Quiz Discussion

11	2	Student understands the lecture	Elastic Hydrodynamic Lubrication	Theoretical lecture	Daily Quiz Discussion
12	2	Student understands the lecture	Human Joints	Theoretical lecture	Daily Quiz Discussion
13	2	Student understands the lecture	Lubrication of Human Joints	Theoretical lecture	Daily Quiz Discussion
14	2	Student understands the lecture	Bio tribology of Artificial Joints	Theoretical lecture	Daily Quiz Discussion
15	2	Student understands the lecture	Lubrication of Artificial Joints	Theoretical lecture	Daily Quiz Discussion

11. Course Evaluation

Mid exam	25%
Participation , assignments, presentation,	15%
Final exam	60%
`total	100%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Biotribology by J. Paulo Davim, 2013
Main references (sources)	Biotribology by J. Paulo Davim, 2013
Recommended books and references (scientific journals, reports…)	Journal of Biotribology, ISSN 2352-5738
Electronic References, Websites	Websites of companies manufacturi medical implants and prosthetics

Unit Description Form

Course Description Form

Faculty of Engineering / Department of

Unit Information

Course Information

Unit Title	**Microprocessors**	**Unit delivery**	
Unit Type	**fundamental**	☒ نظريه ☒ حاضر ☒ المختبر ☐ تعليمي ☐ عملي ☐ Seminar	
Unit Code	BME-51-6		
ECTS Credits	**8**		
SWL (ساعة / SEM)	**30**		
Unit level	3	**Delivery Semester**	2
Department of Administration	Biomedical	**College**	Engineering
Unit Commander	Hussein Abdul karim	**E-mail Address**	hussein.abd@uowa.edu.iq
Title of Unit Commander	Assistant Doctor	**Unit Commander Qualifications**	Doctor
Unit Teacher		**E-mail Address**	
Peer Reviewer Name		**E-mail Address**	E-mail Address
Date of accreditation of the Scientific Committee	26/9/2024	**Version number**	1.0

Relationship with other units

Relationship with other subjects

Prerequisites Unit	No	**Semester**	
Common Requirements Unit	No	**Semester**	

Unit objectives, learning outcomes and how-to contents Course objectives, learning outcomes and instructional contents	
Objectives of the Unit Course Objectives	• Understand the basic foundations of microprocessors: Learn about the components of a microprocessor and how it works. • Study Microprocessor Design: Learn how to design a processor using modules such as controller, arithmetic and logic unit, and memory. • Microprocessor Programming: Learn how to write and develop programs that run on microprocessors using languages such as Assembly or C. • Microprocessor applications: Understand how microprocessors are used in various applications such as embedded systems, hardware control, and data processing. • Performance analysis: The study of how microprocessor performance is measured and analyzed in certain applications.
Unit Learning Outcomes Learning outcomes of the course	1. Understanding microprocessor components: Know how microprocessor units are integrated. 2. Systems design using microprocessors: The ability to design electronic systems using microprocessors. 3. Microprocessor Programming: Writing processor-compatible programs using low-level programming languages. 4. Performance analysis: The ability to evaluate performance and troubleshoot potential problems in systems that use microprocessors. 5. Application of microprocessors: The ability to apply the processor in embedded systems such as controllers and smart cars.
Indicative Contents Indicative Contents	1. Introduction to Microprocessors: Definition of microprocessor and its basic components. 2. Microprocessor units: such as controller, arithmetic and logic unit, memory, and I/O interfaces. 3. Processor architectural design: Understand how the processor is designed at the circuit level. 4. Microprocessor Programming: Learn programming languages such as Assembly and C for software development. 5. Microprocessor applications: use in embedded systems, industrial control, and smart devices. 6. Performance analysis: How to measure processor efficiency in certain applications.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	1. Hands-on learning: Conducting hands-on experiments to design systems using microprocessors and programming. 2. Case Study: Analysis of real applications of microprocessors in different systems. 3. Project-based education: Design and implement practical projects using microprocessors. 4. Use of simulators: Train students to use microprocessor simulators to test software systems. 5. Interactive discussions: Discuss challenges related to the design and programming of microprocessors in advanced systems.

Student Workload (SWL) The student's academic load is calculated for 15 weeks			
SWL منظم (h / sem) Regular academic load of the student during the semester	30	**SWL regulator(h/s)** Regular student load per week	5
SWL غير منظم (h / sem) Irregular academic load of the student during the semester	15	**Unregulated SWL (h/s)** Irregular student academic load per week	5
SWL إجمالى (h / sem) The student's total academic load during the semester	45		

Unit Evaluation Course Evaluation					
As		**Time/Number**	**Weight (tags)**	**Week due**	**Related learning outcomes**
Formative Assessment	**Contests**	2	10% (10)	5, 10	LO #1 , 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO #3 , 4, 6 and 7
	Projects /Laboratory.	1	10% (10)	continuous	every
	report	1	10% (10)	13	LO #5 , 8 and 10
Final Assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1-7
	Final Exam	2 hours	50% (50)	16	every
		Overall Rating	100 %(100 degree)		