

# Southern Technical University الجامعة التقنية الجنوبية



*First Cycle – Bachelor's Degree (B.Sc.) -  
Electromechanical Systems Techniques Engineering*  
بكالوريوس - هندسة تقنيات النظم الكهروميكانيكية



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### 1. Overview

This catalogue is about the courses (modules) given by the program of Electrical Engineering to gain the Bachelor of Science degree. The program delivers (42) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة تقنيات النظم الكهروميكانيكية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٢) مادة دراسية، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

## 2. Undergraduate Courses 2024-2025

### Module 1

Code	Course/Module Title	ECTS	Semester
STUTTC111	Fundamentals of Electrical Engineering	9	1
Class (hr/w)	Lect/Lab/Tutor	SSWL (hr/sem)	USWL (hr/w)
4	5	139	86
Description			
<p>This course provides the main features of the Fundamentals of Electrical Engineering for the students of 1st level, first-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"> <li>1. Learn the fundamentals and principles of electrical engineering.</li> <li>2. Understand electric circuit elements.</li> <li>3. Analysis of electric circuits.</li> <li>4. Apply Electrical circuits theorems.</li> <li>5. Calculate of currents, voltages and electrical power for DC and AC circuits</li> <li>6. Analysis of resonance in AC circuits (Series and parallel resonance).</li> <li>7. Analysis of Electromagnetic circuits.</li> </ol>			

**Module 2**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC112	Engineering Materials	9	1
<b>Class (hr/w)</b>	<b>Lect/Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	4	109	116
<b>Description</b>			
<p>This course provides the main features of the engineering materials for the students of 1st level, first-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of material science.</li><li>2. Illustration and discussion the principles of material structure-selection and description.</li><li>3. To select a material for a given use based on considerations of cost and performance.</li><li>4. To be able to create a new material that will have some desirable properties.</li><li>5. To understand the limits of materials and the change of their properties with use.</li></ol>			

**Module 3**

Code	Course/Module Title	ECTS	Semester
STUTTC113	Mathematics	7	1
Class (hr/w)	Lect/Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	94	81
Description			
<p>This course provides the main features of the mathematics for the students of 1st level, first-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To develop problem solving skills and understanding of mathematics through the application of techniques.</li><li>2. To understand fundamental functions, differentiation, integration.</li><li>3. This course deals with the basic concepts of differentiation of the functions.</li><li>4. This is the basic subject for all simple function, polynomials, and power, rational functions.</li><li>5. To understand problems like derivatives applications, change rate, draw functions, derivatives of trigonometric functions, natural logarithm and exponential functions, log function and other types of functions.</li><li>6. To develop knowledge and techniques to integrate various types of function and integration application, finding area, volumes, methods of integration.</li></ol>			

**Module 4**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STU103	Computer fundamentals /1	3	1
<b>Class (hr/w)</b>	<b>Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
1	2	49	26
<b>Description</b>			
<p>This course provides the main features of the Fundamentals of computer/1 for the students of 1st level, first-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To develop problem-solving skills and an understanding of the computer through the application of techniques</li><li>2- To understand the work of the electronic computer and the possibility of dealing with it</li><li>3. Developing an understanding of the fundamental concepts of computer science, including programming, algorithms, data structures, computer architecture, operating systems, and networks.</li><li>4. Developing practical skills in software development, including programming, debugging, testing, and documentation.</li><li>5. Developing problem-solving skills, including the ability to analyze problems, design solutions, and implement them using appropriate programming languages and tools.</li><li>6. Developing an understanding of the ethical and social issues related to computing, including privacy, security, intellectual property, and the digital divide.</li><li>7. Developing an understanding of the role of computer science in society, including its impact on industry, government, healthcare, and education.</li><li>8. Developing an appreciation for the diversity of applications of computer science, including artificial intelligence, machine learning, robotics, and data science.</li></ol>			

**Module 5**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STU102	Human Rights and Democracy	2	1
<b>Class (hr/w)</b>		<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2		33	17
<b>Description</b>			
<p>This course provides the main features of the human rights for the students of 1st level, first-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1- Knowledge of human rights.</li><li>2- Learn about the natural and protected human rights that governments and the international community provide for people.</li><li>3- The aim of this study unit is to introduce students to what a right is, what their natural rights are, and what their political rights are.</li></ol>			

**Module6**

Code	Course/Module Title	ECTS	Semester
STUTTC121	Electronic Physics	9	2
Class (hr/w)	Lect/Lab	SSWL (hr/sem)	USWL (hr/w)
3	4	109	116
Description			
<p>This course provides the main features of the electronic physics for the students of 1st level, second-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To understand the fundamentals of structure of the atom, orbitals in the atom, energy levels connectivity, semiconductors.</li><li>2. To have knowledge about the physics of semiconductor materials.</li><li>3. To understand the characteristics and theories in semiconductor materials in terms of crystal structures, charge carriers and energy bands.</li><li>4. To describe crystalline structures of semiconductors. describe band structures of semiconductors.</li><li>5. To explain the properties of n-type and p-type semiconductors.</li></ol>			



**Module 7**

Code	Course/Module Title	ECTS	Semester
STUTTC122	Engineering Mechanics	7	2
Class (hr/w)	Lect	SSWL (hr/sem)	USWL (hr/w)
3	3	94	81
Description			
<p>This course provides the main features of the engineering mechanics for the students of 1st level, second-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To develop problem solving skills and understanding of mechanics theory through the application of techniques.</li><li>2. To understand force, resultant and vectors from a mechanical devices.</li><li>3. This course deals with the basic concept of statics and dynamics mechanics.</li><li>4. This is the basic subject for all mechanics parts.</li><li>5. To understand force moment, equilibrium, centroid and moment of inertia problems.</li><li>6. To know about friction problems perform mechanics dynamics analysis.</li></ol>			

## Module 8

Code	Course/Module Title	ECTS	Semester
STUTTC123	Engineering and electrical Drawing	6	2
Class (hr/w)	Lect/prac	SSWL (hr/sem)	USWL (hr/w)
1	6	110	40
Description			
<p>This course provides the main features of the engineering and electrical drawing for the students of 1st level, second-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To understand manual drafting and dimensioning of views</li><li>2. To perform lines drawing, simple sketches and modify dimensions.</li><li>3. This course deals with the basic concept of electrical drawing.</li><li>4. To understand sections and isometrics.</li><li>5. Explains the principles of orthographic views</li><li>6. To understand multi view projection.</li><li>7. To understand sectional view drawing</li></ol>			

## Module 9

Code	Course/Module Title	ECTS	Semester
STU101	English language/1	2	2
Class (hr/w)		SSWL (hr/sem)	USWL (hr/w)
2		34	16
Description			
<p>This course provides the main features of the Fundamentals of English language/1 for the students of 1st level, second-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Develop students skills in understanding the basic grammars of English.</li><li>2. Develop students' speaking skills in English.</li><li>3. Develop students' listening skills in English.</li><li>4. Develop students' reading skills in English.</li><li>5. Develop students' reading skills in English.</li></ol>			

**Module 10**

Code	Course/Module Title	ECTS	Semester
STUTTC125	Workshops	6	2
	<b>prac</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
	6	94	56
<b>Description</b>			
<p>This course provides the main features of the workshops for the students of 1st level, second-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Enable the student to know and understand the theoretical and practical principles of the plumbing workshop.</li><li>2. Enable the student to know and understand the theoretical and practical principles of the electrical workshop.</li><li>3. Enable the student to know and understand the theoretical and practical principles of the blacksmithing workshop.</li><li>4. Enable the student to know and understand the theoretical and practical principles of the turning workshop.</li><li>5. Enable the student to know and understand the theoretical and practical principles of the automobile workshop.</li><li>6. Design of various models and Manufacture of some simple products.</li></ol>			

## Module 11

Code	Course/Module Title	ECTS	Semester
STUTTC231	Electrical Machines	7	3
Class (hr/w)	Lect/Lab	SSWL (hr/sem)	USWL (hr/w)
3	4	109	66
Description			
<p>This course provides the main features of the Electrical Machines for the students of 2nd level, third-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of electrical machines.</li><li>2. Illustration and discussion the principles of DC and AC machines, Description of the machine, as well as its operation in electrical machines.</li><li>3. The ability to analyses existing electrical machines and contribute to new designs.</li></ol>			

**Module 12**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC232	Thermodynamic and fluid	7	3
<b>Class (hr/w)</b>	<b>Lect/Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	4	109	66
<b>Description</b>			
<p>This course provides the main features of the Thermodynamic and fluid for the students of 2nd level, third-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of Thermodynamics and Fluid Mechanics.</li><li>2. Illustration and discussion the principles of heat, work, internal energy, 1<sup>st</sup> and 2<sup>nd</sup> law of thermodynamics as well as applications.</li><li>3. The ability to analyses existing fluid systems and contribute to new designs.</li></ol>			

### Module 13

Code	Course/Module Title	ECTS	Semester
STUTTC233	Electrical and Electronic Circuits	7	3
Class (hr/w)	Lect/Lab/ Tutor	SSWL (hr/sem)	USWL (hr/w)
3	5	124	51
Description			
<p>This course provides the main features of the fundamentals of electrical and electronic circuits for the students of 2nd level, third-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. An understanding of Dimensional Analysis of Electrical and electronic circuits.</li><li>2. At the end of the year the student should be able demonstrate knowledge and understanding of the concepts, theory, and application of electrical and electronic circuits.</li><li>3. The ability to the analysis of electrical and electronic circuits.</li><li>4. Selection and application of appropriate analysis techniques.</li><li>5. knowledge of engineering methodologies</li></ol>			

## Module 14

Code	Course/Module Title	ECTS	Semester
STUTTC234	Advance Mathematics	4	3
Class (hr/w)	Lect/ Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	79	21
Description			
<p>This course provides the main features of the advance mathematics for the students of 2nd level, third-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. to graduates a qualified engineer's who they have theoretical experience in advanced mathematics in electromechanical field.</li><li>2. To provide theoretical knowledge and principles of advanced mathematics and the ability to analysis and solve the mathematical problems.</li><li>3. Illustration and discussion the main theoretical principles of functions of two and more variables, different types of differential equations and their solutions, Laplace transforms, power series, Taylor and Fourier series, vectors , techniques of derivative, integration and differential equation with their applications in electromechanical field.</li></ol>			



**Module 15**

Code	Course/Module Title	ECTS	Semester
STU201	Fundamentals of computer/2	3	3
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
1	2	49	26
Description			
<p>This course provides the main features of the Fundamentals of computer/2 for the students of 2nd level, fourth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1- Introducing the student to the most basic rules in dealing with networks</li><li>2- The student's knowledge of the development that has accompanied networks since their inception to the present time.</li><li>3- The student acquires practical skills through the use of Excel 2010.</li><li>4- Defining the network components and their work for a student.</li><li>5- Enabling the student to use application software to provide services to the user in performing many tasks on the computer.</li></ol>			

## Module 16

Code	Course/Module Title	ECTS	Semester
STU203	جرائم نظام البعث في العراق	2	3
Class (hr/w)		SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>في هذا المقرر الدراسي سيتعرف الطالب على جرائم حزب البعث البائد. أن الاهداف هي:</p> <ol style="list-style-type: none"><li>1- المعرفة بجرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا عام ٢٠٠٥ م</li><li>2- المعرفة بالجرائم النفسية والاجتماعية وأثارها، وأبرز انتهاكات النظام البعثي في العراق</li><li>3- المعرفة بالجرائم البيئية لنظام البعث في العراق</li><li>4- المعرفة بجرائم المقابر الجماعية</li></ol>			

**Module17**

Code	Course/Module Title	ECTS	Semester
STUTTC241	Electrical devices and measurements	7	4
Class (hr/w)	Lect/Lab	SSWL (hr/sem)	USWL (hr/w)
3	4	109	66
Description			
<p>This course provides the main features of the Fundamentals of Electrical devices and measurement for the students of 2nd level, fourth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Illustration and discussion the theory of measurement including static characteristics of instruments, various standards, error analysis, classifications and statistical analysis.</li><li>2. Illustrate the principles design theory of various dc and ac analogue voltmeters, Ammeters Watt meters, and single phase energy meter.</li><li>3. Discuss and analyze various dc and ac bridges used for the measurement of resistances, impedances and associated parameters like inductance, capacitance and frequency.</li><li>4. Explain the various active and passive transducers; also it includes a detail discussion of the theory and application of some transducers for example, strain gauges, LVDT, thermister, piezoelectric, etc.</li><li>5. Illustration and discussion of CRT and the various parts of CRO. And the theory of operation of the instrument.</li><li>6. Giving knowledge and unfolds the details of various signal analyzers such as distortion, waveform and spectrum analyzers.</li><li>7. Illustrate the certain advantages of electronic meters as compared to analogue.</li></ol>			

## Module 18

Code	Course/Module Title	ECTS	Semester
STUTTC242	Electronics	8	4
Class (hr/w)	Lect/Lab	SSWL (hr/sem)	USWL (hr/w)
3	4	109	91
Description			
<p>This course provides the main features of the electronics for the students of 2st level, fourth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To provide a knowledge of electronic circuits.</li><li>2. Illustration and discussion the principles of electronics.</li><li>3. The ability to analyze and solve problems.</li><li>4. Knowledge of the methods associated with electronics according to modern techniques methods.</li></ol>			

**Module 19**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC243	Strength of Materials	8	4
<b>Class (hr/w)</b>	<b>Lect/Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	4	109	91
<b>Description</b>			
<p>This course provides the main features of the strength of materials for the students of 2nd level, fourth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. The mathematical background for the different topics of strength of materials introduced in this course</li><li>2. To understand stress concept and types of stresses</li><li>3. Illustrate the internal forces in beams, how to draw shear force and bending moment diagrams Electrical circuits theorems.</li><li>4. To understand stress strain relationship and solving problems</li><li>5. To understand beam analysis, stresses in beams, beam theory and shear stresses</li><li>6. To understand torsion in shafts, determination of shear stresses and twisting angle due to torsion.</li></ol>			

**Module 20**

Code	Course/Module Title	ECTS	Semester
STUTTC244	Advanced Programming	5	4
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>This course provides the main features of the programming for the students of 2nd level, fourth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Understanding and knowing how programming languages work</li><li>2. Dealing with problems and analyzing them logically.</li><li>3. Problem-solving using programming.</li><li>4. Choose the best way to perform the tasks programmatically.</li><li>5. Implementation and translation of ideas appropriately to meet my needs and the needs of others from the program.</li></ol>			

**Module 21**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STU202	English Language/2	2	4
<b>Class (hr/w)</b>		<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2		34	16
<b>Description</b>			
<p>This course provides the main features of the English language/2 for the students of 2nd level, third-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Develop students skills in understanding the grammars of English.</li><li>2. Develop students' speaking skills in English.</li><li>3. Develop students' listening skills in English.</li><li>4. Develop students' reading skills in English.</li><li>5. Develop students' reading skills in English.</li></ol>			

**Module 22**

Code	Course/Module Title	ECTS	Semester
STUTTC351	Electric Power Systems	6	5
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
3	3	94	56
Description			
<p>This course provides the main features of the electric power system for the students of 3rd level, fifth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of electrical power system.</li><li>2. Illustration and discussion the principles of power station and types , transmission line .</li><li>3. To study the types of electrical generation stations, types of transmission lines and insulators used in the transmission of electrical power .</li><li>4. Knowledge of the functions of the parts of the generating station</li><li>5. Load curve analysis and capacity generation stations</li><li>6. To analyze transmission lines and calculate the diameters and number of conductors in the transmission line.</li></ol>			



**Module 23**

Code	Course/Module Title	ECTS	Semester
STUTTC352	Heat transfer and Hydraulic systems	6	5
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
3	3	94	56
Description			
<p>This course provides the main features of the heat transfer and hydraulic systems for the students of 3rd level, fifth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1- To define the heat transfer modes concepts.</li><li>2- To define the theoretical basics of the conduction heat transfer Coincided with a laboratory experiment.</li><li>3- To define the theoretical basics of the forced and free convective heat transfer Coincided with a laboratory experiment.</li><li>4- To define the theoretical basics of the radiation heat transfer.</li><li>5- To define the theoretical basics of the heat exchangers Coincided with a laboratory.</li><li>6- To define the theoretical basics of the mixed modes of heat transfer.</li></ol>			

**Module 24**

Code	Course/Module Title	ECTS	Semester
STUTTC353	Communications	5	5
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
3	3	94	31
Description			
<p>This course provides the main features of the communication for the students of 3rd level, fifth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of communications.</li><li>2. Illustration and discussion the principles of communications system, description of type of signals, filters and modulation (AM,FM and PM) as well as transportation lines with basic equations and analysis.</li><li>3. To understand the components of signals, their types, and the operations that are performed on them.</li><li>4. To understand the analysis of communication systems and how to obtain the best designs.</li></ol>			

**Module 25**

Code	Course/Module Title	ECTS	Semester
STUTTC354	Theory of Machines	5	5
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
3	3	94	31
Description			
<p>This course provides the main features of the theory of machines for the students of 3rd level, fifth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of theory of machines.</li><li>2. Illustration and discussion the principles of machines, description of the machine, as well as its operation in theory of machines.</li><li>3. To analyses existing theory of machines and contribute to new designs.</li></ol>			

## Module 26

Code	Course/Module Title	ECTS	Semester
STUTTC355	Control Theory	4	5
Class (hr/w)	Lect/Tut	SSWL (hr/sem)	USWL (hr/w)
2	2	64	36
Description			
<p>This course provides the main features of the control theory for the students of 3rd level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"> <li>1- To introduce different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form to interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis.</li> <li>2- To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions and identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system            Formulate different types of analysis in frequency domain to explain the nature of stability of the system.</li> </ol>			

**Module 27**

Code	Course/Module Title	ECTS	Semester
STUTTC355	control systems	4	5
Class (hr/w)	Lect/Tut	SSWL (hr/sem)	USWL (hr/w)
2	2	64	36
Description			
<p>This course provides the main features of the control systems for the students of 3rd level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1- To introduce different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form to interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis.</li><li>2- To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions and identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system</li><li>3- Formulate different types of analysis in frequency domain to explain the nature of stability of the system</li></ol>			

**Module 28**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC361	Synchronous and special Machines	7	6
<b>Class (hr/w)</b>	<b>Lect/Lab/Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	5	124	51
<b>Description</b>			
<p>This course provides the main features of the synchronous and special machines for the students of 3rd level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To provide a knowledge of synchronous &amp; special machines.</li><li>2. Illustration and discussion the principles of synchronous &amp; special machines, description of the machine, as well as its operation in synchronous &amp; special machines.</li><li>3. To analyses existing of synchronous &amp; special machines and contribute to new designs.</li></ol>			

**Module 29**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC362	Vibration Theory	6	6
<b>Class (hr/w)</b>	<b>Lect/Lab/</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	4	109	41
<b>Description</b>			
<p>This course provides the main features of the vibration for the students of 3rd level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"> <li>1- Calculating the natural frequencies and their mode shapes to avoid resonance locations within the range of the system operating speeds, especially at the design stage.</li> <li>2- Studying the means of vibration minimizing and isolation and controlling the transmissibility of vibration to the floor or base.</li> <li>3- Simulating the mechanical system of 1st, 2nd degree of freedom.</li> </ol>			

**Module 30**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC363	Industrial Engineering	6	6
<b>Class (hr/w)</b>	<b>Lect</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	2	78	72
<b>Description</b>			
<p>This course provides the main features of the industrial engineering for the students of third level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of Industrial engineering.</li><li>2. Illustration and discussion the principles of the scope of Industrial Engineering and the Management Process.</li><li>3. To understand of the fundamentals of production and the productivity.</li></ol>			



**Module 31**

Code	Course/Module Title	ECTS	Semester
STUTTC364	Electromechanical designs	6	6
Class (hr/w)	Lect	SSWL (hr/sem)	USWL (hr/w)
3	2	78	72
Description			
<p>This course provides the main features of the electromechanical designs for the students of 3rd level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1- Cover the basics of machine design, including the design process, engineering mechanics and materials, failure prevention under static and variable loading, and Characteristics of the principal types of mechanical elements.</li><li>2- Offer a practical approach to the subject through a wide range of real-world applications and examples.</li><li>3- Identify appropriate analytical models to describe and predict the behavior of standard machine components;</li><li>4- Apply stress analysis theory, fatigue theory and appropriate criteria of failure to the design of simple machine elements;</li><li>5- Select appropriate mechanical components from manufacturers' catalogues;</li><li>6- Apply codes and standards to machine component design;</li><li>7- Understand safety and reliability concepts in the design of machine elements.</li><li>8- Communicate the results of a design assignment by means of drawings and a design report.</li></ol>			

**Module 32**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC365	Engineering and Numerical Analysis	5	6
<b>Class (hr/w)</b>	<b>Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	1	63	62
<b>Description</b>			
<p>This course provides the main features of the engineering and numerical analysis for the students of 3rd level, sixth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of engineering and numerical analysis.</li><li>2. Illustration and discussion the principles of engineering and numerical analysis.</li><li>3. To provide you with an understanding of the fundamentals of engineering and numerical analysis.</li></ol>			

**Module 33**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC471	Power Electronics and Drive	7	7
<b>Class (hr/w)</b>	<b>Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	3	94	81
<b>Description</b>			
<p>This course provides the main features of the power electronics and drive for the students of 4th level, seventh-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To acquire in-depth knowledge of power electronic circuits for real-time applications.</li><li>2. To solve problems in power electronics.</li><li>3. To analyze power electronics using existing modern tools for enhancement of knowledge.</li></ol>			

**Module 34**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC472	Electromechanical Devices	7	7
<b>Class (hr/w)</b>	<b>Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	3	94	81
<b>Description</b>			
<p>This course provides the main features of the electromechanical devices for the students of 4th level, seventh-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To provide a knowledge of electromechanical devices.</li><li>2. Illustration and discussion the principles of electromechanical devices.</li><li>3. The student should be able demonstrate knowledge and understanding of the concepts, theory and application of electromechanical devices.</li></ol>			

**Module 35**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC473	Automation and Control	5	7
<b>Class (hr/w)</b>	<b>Lect</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	1	64	61
<b>Description</b>			
<p>This course provides the main features of the automation and control for the students of 4th level, seventh-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of automation and control.</li><li>2. Illustration and discussion the principles of automation and control.</li><li>3. The student should be able demonstrate knowledge and understanding of the concepts, theory and application of automation and control.</li></ol>			

**Module 36**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC474	Computer Aided Design and Manufacturing	6	7
<b>Class (hr/w)</b>	<b>Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	3	94	56
<b>Description</b>			
<p>This course provides the main features of the computer aided design and manufacturing for the students of 4th level, eighth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of computer aided design and manufacturing (CAM CAD).</li><li>2. Learn to draw in 2D, 3D.</li><li>3. Drawing some manufacturing drawings by AutoCAD.</li></ol>			

**Module 37**

Code	Course/Module Title	ECTS	Semester
STUTTC475	Renewable Energy	5	7
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
3	3	94	31
Description			
<p>This course provides the main features of the <b>Renewable Energy</b> for the students of 4th level, eighth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. To present the fundamental principles and architecture of Renewable Energy systems.</li><li>2. To discuss, examine, and evaluate the key technological components of Renewable Energy.</li><li>3. To review key technological applications of Renewable Energy.</li></ol>			

**Module38**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC481	Signals and systems	6	8
<b>Class (hr/w)</b>	<b>Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	3	94	56
<b>Description</b>			
<p>This course provides the main features of the signals and systems for the students of 4th level, eighth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. It provides a knowledge of signals and systems.</li><li>2. Illustration and discussion the principles of signals and systems.</li><li>3. Knowledge of the methods associated with signals and systems.</li></ol>			



### Module 39

Code	Course/Module Title	ECTS	Semester
STUTTC482	Microprocessors and Microcontrollers	6	8
Class (hr/w)	Lab	SSWL (hr/sem)	USWL (hr/w)
3	3	94	56
Description			
<p>This course provides the main features of the microprocessors and microcontrollers for the students of 4th level, eighth-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"> <li>1. To provide a knowledge of microprocessors and microcontrollers.</li> <li>2. Illustration and discussion the principles of microprocessors and microcontrollers in digital systems, Description of the digital control concepts using microprocessors and micro controllers and it`s applications.</li> <li>3. Explanation the architecture of 8086 microprocessor and 8051 microcontroller and the internal hardware of them, as well as the assembly programing languages of each microchip. The method of learning is based on an applied approach.</li> </ol>			

**Module 40**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC483	Air condition and Cooling systems	6	8
<b>Class (hr/w)</b>	<b>Lab</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
3	3	94	56
<b>Description</b>			
<p>This course provides the main features of the air condition and cooling systems for the students of 4th level, seventh-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Understand basics of air-condition and refrigeration systems and their operations.</li><li>2. Have ability to compute the thermal loads, thermal comfort and design conditions and ducts system design.</li><li>3. Control device and automatic control of the air- conditioning and refrigeration systems and their applications and have ability and knowledge to select air-conditioning and refrigeration equipment's.</li></ol>			

**Module 41**

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
STUTTC484	Engineering project	6	8
<b>Class (hr/w)</b>	<b>prac</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/w)</b>
2	4	93	57
<b>Description</b>			
This course provides the main features of the engineering project for the students of 4th level, seventh-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study.			

## Module 42

Code	Course/Module Title	ECTS	Semester
STUTTC485	Programmable Logic controllers	6	8
Class (hr/w)	prac	SSWL (hr/sem)	USWL (hr/w)
3	3	94	56
Description			
<p>This course provides the main features of the Programmable Logic controllers for the students of 4th level, seventh-semester, in electromechanical systems techniques engineering department. Learning outcomes which gained by this program will help a student to achieve and demonstrate the learning opportunities that are provided during the course study. The aims which can be achieved during teaching this course program are</p> <ol style="list-style-type: none"><li>1. Characteristics of a PLC</li><li>2. Know general PLC issues</li><li>3. Understanding of PLC programming, ladder logic</li><li>4. Understand and design basic input and output wiring</li><li>5. Analysis and classification of the process control</li><li>6. Interlocking process control</li><li>7. Sequential process control</li><li>8. Random process control</li><li>9. Understand the operation of a PLC</li><li>10. Understanding of Siemens or Mitsubishi PLC hardware units and utilizing them.</li></ol>			

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