



32. Course Specification of Engineering Economy

I. Course Identification and General Information:						
1.	Course Title:	Engineering Economy				
2.	Course Code & Number:	BR232				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	-	-	2
4.	Study level/ semester at which this course is offered:	Third year/ First semester				
5.	Pre –requisite (if any):	Linear Algebra				
6.	Co –requisite (if any):	Engineering Mathematics				
7.	Program (s) in which the course is offered:	Electrical Power and Machines Engineering				
8.	Language of teaching the course:	English				
9.	Location of teaching the course:	Class				
10.	Prepared By:	Asst. Prof. Dr. Thabet M. Al-ghaberi.				
11.	Date of Approval					

II. Course Description:
<p>This course aims to provide students with knowledge necessary for an engineering economy and its applications such as engineering-economical-management and time-cost-quality relations. It will provide useful practical knowledge about interest rate, feasibility study and decision-making processes and economic engineering analysis. Course topics include methods of planning, scheduling, automations systems and programs applied in production, industrial projects, identify, and evaluate the quality standards and solving engineering problems, principles of value engineering investments and public projects, principles of Engineering Statistics descriptive and inferential and its applications, selection operations in experiments and analyzing preliminary data. It will study the possibilities, and simulation of engineering systems before applying them, use of time engineering and statistical methods to study processes that occur frequently in manufacturing, probabilities and statistical methods to designing mathematical model of dynamics Systems, Control and match the quality of manufacturing and production processes to achieve Engineering standard and reliability, use the probabilities and statistical. By the end of the course the students will be able to prepare</p>

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feasibility study, formulate and identify the impact elements for success and development of an engineering economy and statistics.

III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a1	Define the present time requirements for technical, economical engineering functions, projects based on specific, updated Information and databases aims to minimize costs and maximize interest with good quality.	A1
a2	Demonstrate commitment to professional ethics and responsibilities by knowing the laws, regulations, and procedures of electrical engineering practices and maintain the peculiarities of the profession as cods, icons of systems, programs and analysis results.	A2
b1	Use modern methods, for analyzing preliminary and various statistical data.	B1
b2	Identify the deferent development caseworks of the economical, societal, environmental taking care of them during the electrical power, communication, computer engineering projects.	B2
c1	Apply the knowledge, experience and skills to Use statistical methods to model mathematical systems of dynamics.	C1
c2	Conduct random selection operations in experiments with interpret data, simulation of electrical engineering projects.	C2
d1	Work effectively and successfully in different engineering work environments individual, as a member or leader in a multi-disciplinary team.	D1
d2	Ability the theoretical knowledge, skills, experience necessary for effective and successful communication both orally and in writing technical reports, presentations, recommendations, proposed alternatives and costs for repairing and maintenance.	D2

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies

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<p>a1 Define the present time requirements for technical, economical engineering functions, projects based on specific, updated Information and databases aims to minimize costs and maximize interest with good quality.</p>	<ul style="list-style-type: none"> ▪ Lectures ▪ Tutorials ▪ Problem solving 	<ul style="list-style-type: none"> ▪ Homework ▪ Quizzes ▪ Major Exams ▪ Presentation & Discussions
<p>a2 Demonstrate commitment to professional ethics and responsibilities by knowing the laws, regulations, and procedures of electrical engineering practices and maintain the peculiarities of the profession as cods, icons of systems, programs and analysis results.</p>	<ul style="list-style-type: none"> ▪ Presentation & Discussions ▪ Practical assessment ▪ Participation 	<ul style="list-style-type: none"> ▪ Homework ▪ Quizzes ▪ Major Exams ▪ Presentation & Discussions ▪ Practical assessment ▪ participation

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
<p>b1 Use analysis modern methods, for analyzing preliminary and various statistical data.</p>	<ul style="list-style-type: none"> ▪ Lectures & Class activity ▪ Practical work at class ▪ Problem-based learning 	<ul style="list-style-type: none"> ▪ Homework ▪ Quizzes ▪ Major Exams ▪ Problem Sets (Exercises) ▪ Class attendance & participation ▪ Problem-based learning ▪ Reports
<p>b2 Identify the deferent development caseworks of the economical, societal, environmental taking care of them during the electrical power, communication, computer engineering projects.</p>	<ul style="list-style-type: none"> ▪ Lectures & Class activity ▪ Practical work at class ▪ Problem-based learning 	<ul style="list-style-type: none"> ▪ Homework ▪ Quizzes ▪ Major Exams ▪ Problem Sets (Exercises) ▪ Class attendance & participation ▪ Problem-based

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© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1 Apply the knowledge, experience and skills to Use statistical methods to model mathematical systems of dynamics.	<ul style="list-style-type: none"> ▪ Lectures & Class activity ▪ Collaborative /Discovery based on Practical training 	<ul style="list-style-type: none"> ▪ Homework ▪ Quizzes ▪ Major Exams ▪ Problem Sets (Exercises) ▪ Class attendance & participation ▪ Problem-based learning ▪ Reports
c2 Conduct random selection operations in experiments with interpret data, simulation of electrical engineering projects.	<ul style="list-style-type: none"> ▪ Lectures & Class activity ▪ Collaborative /Discovery based on Practical training 	<ul style="list-style-type: none"> ▪ Homework ▪ Quizzes ▪ Major Exams ▪ Problem Sets (Exercises) ▪ Class attendance & participation ▪ Problem-based learning ▪ Reports

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1 Work effectively and successfully in different engineering work environments individual, as a member or leader in a multi-disciplinary team.	<ul style="list-style-type: none"> ▪ Class activity ▪ Practical training 	<ul style="list-style-type: none"> ▪ Reports ▪ Assigned Prac. Problems
d2 Ability the theoretical knowledge, skills, experience necessary for effective and successful communication both orally and in writing technical reports, presentations, recommendations, proposed alternatives and costs for repairs and maintenance.	<ul style="list-style-type: none"> ▪ Class activity ▪ Practical training 	<ul style="list-style-type: none"> ▪ Reports ▪ Assigned Prac. Problems

IV. Course Content:

A – Theoretical Aspect:

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Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	The principles of Engineering economy and its applications. Engineering-economical-management and time-cost-quality relations. Engineering process and production cycle.	a1	<ul style="list-style-type: none"> ▪ Principles of Engineering economy, applications. ▪ Engineering Economical management, ▪ Time-cost-quality relations. ▪ Engineering process, Production cycle. 	1	2
2.	Cost estimation. Feasibility studies and decision-making	a1,a2,b1	<ul style="list-style-type: none"> ▪ Types of Costs, ▪ Costs Estimation. ▪ Feasibility studies, decision-making. 	1	2
3.	Demand and price Relationship.	a2,b2	<ul style="list-style-type: none"> ▪ Demand, price ▪ Relationship. 	1	2
4.	Interest and inflation. Time value of money and equivalence. Forms and properties of cash flow diagrams.	a1,a2,c1,c2	<ul style="list-style-type: none"> ▪ Interest, Time value of money, equivalence. ▪ Forms, properties of cash flow diagrams. 	1	2
5.	Engineering alternatives. Projects planning and scheduling.	a1,a2,c1	<ul style="list-style-type: none"> ▪ Engineering alternatives, ▪ Projects planning, -scheduling. 	1	2
6.	Principles of value engineering for power, communication, computer, electronic engineering	b2,c1,c2	<ul style="list-style-type: none"> ▪ Principles of value engineering for engineering investments, Public projects. 	1	2

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	investments and public projects.				
7.	Automations systems and programs applied in engineering projects. Elements of success and development economic engineering and investment projects.	a1,a2,b2,c1	<ul style="list-style-type: none"> Examples of Automations systems, Programs applied in engineering projects. Effects of Elements success and development economic engineering and investment projects. 	2	4
8.	Principles of Engineering Statistics descriptive and inferential and its applications. Collecting and compiling statistical data and information.	a1,a2,b2,c1	<ul style="list-style-type: none"> Principles of Engineering Statistics: descriptive, Inferential, applications. Collecting, compiling statistical data, information. 	1	2
9.	Using tables and graphs for describe the main characteristics of gropes data.	a1,a2,c1,c2	<ul style="list-style-type: none"> Tables, Graphs for describe the main characteristics of gropes data. 	1	2
10.	Identify and formulate scientific and engineering problems using statistical models.	a1,b1,b2,c1	<ul style="list-style-type: none"> Identify, Formulate: scientific, engineering problems, Using statistical models. 	1	2
11.	Determining the system for conducting random	a1,b1,b2,c1	<ul style="list-style-type: none"> Determining, system for conducting 	1	2

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	selection operations in experiments and analyzing preliminary data.		random, -selection operations in experiments, Analyzing data.		
12.	Study the possibilities, and simulation of engineering systems before applying them, The use of time engineering and Statistical methods to study processes that occur frequently in manufacturing.	a1,a2,b2,c1	<ul style="list-style-type: none"> ▪ Study: ▪ Possibilities, simulation of engineering systems. ▪ Time engineering, Statistical methods. 	2	4
Number of Weeks /and Units Per Semester				14	28

V. Teaching strategies of the course:

- Interactive lectures,
- Interactive class discussions,
- Problem based learning,
- Team work (group learning),
- Project\presentation\seminar,
- The use of communication and information technology.

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	Search the web for Classification of engineering and industrial projects and economic methodology and Modern automated programs used in the management & reporting of industrial and productive projects.	a1, c1, c2, d1	6	5

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2.	Feasibility study formulate for an engineering project related to the course and scientific specialization using Software tools.	b1, b2, c1, c2,d1	13	5
Total				10

VII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Quizzes	5,12	10	10%	a1,a2,b1,b2
2.	Assignments	6,13	10	10%	a1, b1,b2,c1,c2,d1
3.	Mid-Term exam	7	20	20%	a1,a2,b1,b2
4.	Simulation projects	13,14	10	10%	b1,b2,c1,c2,d1,d2
5.	Final Exam theory	16	50	50%	a1,a2,b1,b2
Total			100	100%	

VIII. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

1- Required Textbook(s) (maximum two).

1. Donald G. Newnan.Ted G Eschenbach, Economic Engineering analysis, Ninth edition. 2005, OXFORD UNIVERSITY PRESS
2. Douglas C. Montgomery, 2013, Introduction to Statistical Quality Control, 7th Edition John Wiley & Sons, Inc., New York. ISBN: 978-1-118-14681-1

2- Essential References.

1. Douglas C. Montgomery and George C. Runger, 1999, Applied Statistics and Probability for Engineers - Second Edition - John Wiley & Sons, Inc., New York.
2. Douglas C. Montgomery, George C. Runger, and Norma F. Hubele, Engineering Statistics John Wiley & Sons, Inc., New York.

3- Electronic Materials and Web Sites etc.

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	Course Website: http://www.actuar.aegean.gr/index.php/en/academics/undergraduateprograms
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IX. Course Policies:	
1.	Class Attendance: The students should have more than 75 % of attendance according to rules and regulations of the Faculty.
2.	Tardy: The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.
3.	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam.
4.	Assignments & Projects: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5.	Cheating: If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries .
6.	Plagiarism: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7.	Other policies: <ul style="list-style-type: none"> • All the teaching materials should be kept out the examination hall. • The mobile phone is not allowed. • There should be a respect between the student and his teacher.

Reviewed By	<u>Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat</u> <u>President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi</u> <u>Name of Reviewer from the Department: Assoc. Prof. Dr. Radwan Al bouthigy</u>
	<u>Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa</u> <u>Assoc. Prof. Dr. Ahmed Mujahed</u>

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Asst. Prof. Dr. Munasar Alsubri

32. Template for Course Plan of Engineering Economy

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member	Dr. Thabet M. Al-ghaberi.		Office Hours					
Location & Telephone No.			SAT	SUN	MON	TUE	WED	THU
E-mail	Dr.ghaberythabit@gmail.com							

II. Course Identification and General Information:						
1.	Course Title:	Engineering Economy				
2.	Course Number & Code:	BR232				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	-	-	-	2
4.	Study level/year at which this course is offered:	Third year/ First semester				
5.	Pre –requisite (if any):	Linear Algebra				
6.	Co –requisite (if any):	Engineering Mathematics				
7.	Program (s) in which the course is offered	Electrical Power and Machines Engineering				
8.	Language of teaching the course:	English				
9.	System of Study:	Regular				
10.	Mode of delivery:	Semester				
11.	Location of teaching the course:	Class				

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III. Course Description:

This course aims to provide students with knowledge necessary for engineering economy and its applications such as engineering-economical-management and time-cost-quality relations. **It provides** useful practical knowledge about interest rate, feasibility study and decision-making processes and economic engineering analysis. Course topics include methods of planning, scheduling, automations systems and programs applied in production, industrial projects, **identification, and evaluation of** the quality standards and solving engineering problems, principles of value engineering investments and public projects. **It will also explains principles of descriptive and inferential Engineering Statistics** and its applications, selection operations in experiments and analyzing preliminary data. **It will study** the possibilities, and simulation of engineering systems before applying them, use of time engineering and statistical methods to study processes that occur frequently in manufacturing, probabilities and statistical methods to designing mathematical model of dynamics Systems, Control and **matching** the quality of manufacturing and production processes to achieve engineering standard and reliability, **and use of** the probabilities and **statistics**. By the end of the course the students will be able to prepare feasibility study, formulate and identify the impact elements for success and development of an engineering economy and statistics

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:
 1. Define the present time requirements for technical, economical engineering functions, projects based on specific, updated Information and databases aims to minimize costs and maximize interest with good quality.
 2. Demonstrate commitment to professional ethics and responsibilities by knowing the laws, regulations, and procedures of electrical engineering practices and maintain the peculiarities of the profession as cods, icons of systems, programs and analysis results.
 3. **Use modern** methods, for analyzing preliminary and various statistical data.
 4. Identify the deferent development caseworks of the economical, societal, environmental taking care of them during the electrical power, communication, computer engineering projects.
 5. Apply the knowledge, experience and skills to Use statistical methods to model mathematical systems of dynamics.

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6. Conduct random selection operations in experiments with interpret data, simulation of electrical engineering projects.
7. **Work** effectively and successfully in different engineering work environments individual, as a member or leader in a multi-disciplinary team.
8. Ability the theoretical knowledge, skills, experience necessary for **effective and successful communication** both orally and in writing technical reports, presentations, recommendations, proposed alternatives and costs for repairing and maintenance.

V. Course Content:				
A – Theoretical Aspect:				
Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	The principles of Engineering economy and its applications. Engineering-economical-management and time-cost-quality relations. Engineering process and production cycle.	<ul style="list-style-type: none"> ▪ Principles of Engineering economy, applications. ▪ Engineering Economical management, ▪ Time-cost-quality relations. ▪ Engineering process, Production cycle. 	1 st	2
2.	Cost estimation. Feasibility studies and decision-making	<ul style="list-style-type: none"> ▪ Types of Costs, ▪ Costs Estimation. ▪ Feasibility studies, decision-making. 	2 nd	2
3.	Demand and price Relationship.	<ul style="list-style-type: none"> ▪ Demand, price ▪ Relationship. 	3 rd	2
4.	Interest and inflation. Time value of money and equivalence.	<ul style="list-style-type: none"> ▪ Interest, Time value of money, equivalence. ▪ Forms, properties of cash flow diagrams. 	4 th	2

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	Forms and properties of cash flow diagrams.			
5.	Engineering alternatives. Projects planning and scheduling.	<ul style="list-style-type: none"> Engineering alternatives, Projects planning, - scheduling. 	5 th	2
6.	Principles of value engineering for power, communication, computer, electronic engineering investments and public projects.	<ul style="list-style-type: none"> Principles of value engineering for engineering investments, Public projects. 	6 th	2
7.	Med-term exam.		7 th	2
8.	Automations systems and programs applied in engineering projects. Elements of success and development economic engineering and investment projects.	<ul style="list-style-type: none"> Examples of Automations systems, Programs applied in engineering projects. Effects of Elements success and development economic engineering and investment projects. 	8 th , 9 th	4
9.	Principles of Engineering Statistics descriptive and inferential and its applications. Collecting and compiling statistical data and information.	<ul style="list-style-type: none"> Principles of Engineering Statistics: descriptive, Inferential, applications. Collecting, compiling statistical data, information. 	10 th	2
10.	Using tables and graphs for describe the main characteristics of gropes data.	<ul style="list-style-type: none"> Tables, Graphs for describe the main characteristics of gropes data. 	11 th	2

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11.	Identify and formulate scientific and engineering problems using statistical models.	<ul style="list-style-type: none"> Identify, Formulate: scientific, engineering problems, Using statistical models. 	12 th	2
12.	Determining the system for conducting random selection operations in experiments and analyzing preliminary data.	<ul style="list-style-type: none"> Determining, system for conducting random, - selection operations in experiments, Analyzing data. 	13 th	2
13.	Study the possibilities, and simulation of engineering systems before applying them, The use of time engineering and Statistical methods to study processes that occur frequently in manufacturing.	<ul style="list-style-type: none"> Study: Possibilities, simulation of engineering systems. Time engineering, Statistical methods. 	14 th ,15 th	4
14.	Final Exam.		16 th	2
Number of Weeks /and Units Per Semester			16	32

VI. Teaching strategies of the course:

- Interactive lectures,
- Interactive class discussions,
- Problem based learning,
- Team work (group learning),
- Project\presentation\seminar,
- The use of communication and information technology.

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
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1.	Search the web for Classification of engineering and industrial projects and economic methodology and Modern automated programs used in the management & reporting of industrial and productive projects.	a1, c1, c2, d1	6	5
2.	Feasibility study formulate for an engineering project related to the course and scientific specialization using Software tools.	b1, b2, c1, c2,d1	13	5
Total				10

VIII. Schedule of Assessment Tasks for Students During the Semester:				
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Quizzes	5,12	10	10%
2.	Assignments	6,13	10	10%
3.	Mid-Term exam	7	20	20%
4.	Simulation projects	13,14	10	10%
5.	Final Exam theory	16	50	50%
Total			100	100%

IX. Learning Resources:	
<ul style="list-style-type: none"> • <i>Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).</i> 	
1- Required Textbook(s) (maximum two).	
	<ol style="list-style-type: none"> 1. Donald G. Newnan.Ted G Eschenbach, Economic Engineering analysis, Ninth edition. 2005, OXFORD UNIVERSITY PRESS 2. Douglas C. Montgomery, 2013, Introduction to Statistical Quality Control, 7th Edition John Wiley & Sons, Inc., New York. ISBN: 978-1-118-14681-1
2- Essential References.	
	<ol style="list-style-type: none"> 1. Douglas C. Montgomery and George C. Runger, 1999, Applied Statistics and Probability for Engineers - Second Edition - John Wiley & Sons, Inc., New York. 2. Douglas C. Montgomery, George C. Runger, and Norma F. Hubele, Engineering Statistics John Wiley & Sons, Inc., New York.
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X. Course Policies:	
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2.	Tardy: The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.
3.	Exam Attendance/Punctuality: The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam.
4.	Assignments & Projects: The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.
5.	Cheating: If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for enquiries .
6.	Plagiarism: The student will be terminated from the Faculty, if one student attends the exam on another behalf according to the policy, rules and regulations of the university.
7.	Other policies: <ul style="list-style-type: none"> • All the teaching materials should be kept out the examination hall. • The mobile phone is not allowed. • There should be a respect between the student and his teacher.

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