EASTERN MEDITERRANEAN UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE OUTLINE
Spring 2021-22

COURSE CODE	IENG/MANE385	**COURSE LEVEL**	Third Year
COURSE TITLE	Statistical Applications in Engineering	**COURSE TYPE**	Required
CREDIT VALUE	(3, 0, 1) 3	**ECTS**	5
PRE-REQUISITE(S)	-	**CO-REQUISITE(S)**	MATH322
	Name(s)	**E-mail**	**Office**
LECTURER(S)	Asst. Prof. Dr. Ali Baştaş	ali.bastas@emu.edu.tr	IE-C104
ASSISTANT(S)	Aysun Pınarbaşı Negar Akbarzadeh Lalehlou Suhad Rebhi Abdelqader Al - Natoor	aysun.pinarbasi@emu.edu.tr negar.lalehlou@emu.edu.tr suhad.natoor@emu.edu.tr	IE-B202 IE-B107 IE-B201

CATALOG DESCRIPTION

The purpose of the course is to introduce and train students in the application of statistical tools and techniques in industries and other areas. We first introduce students to an array of statistical tools used in presenting and interpreting statistical data. After a brief review of probability distributions, estimation procedures of statistical parameters will be presented. These will include parametric, nonparametric and interval estimation procedures. Testing of statistical hypotheses under various assumptions will be presented. Finally, correlation and regression analysis of bivariate data will be introduced.

AIM & OBJECTIVES

At the end of this course, the student will:

- Identify, analyse, and apply key concepts of presenting and interpreting of statistical data
- Identify, analyse, and apply probability distributions, in particular sampling distributions
- Identify, analyse, and apply key parametric estimation concepts in statistical engineering applications including interval estimation procedures
- Identify, analyse, and apply key hypotheses testing concepts in statistical applications
- Identify, analyse, and apply correlation and regression analysis for bivariate data
- Identify key nonparametric estimation approaches in statistical engineering applications

COURSE LEARNING OUTCOMES (CLOs)

On successful completion of this course, students are expected to **develop knowledge** and **understanding** of:

- Presenting and interpretation of statistical data,
- Statistical Sampling Probability Distributions,
- Parametric, nonparametric and interval estimation procedures
- Hypotheses Testing,
- Correlation and Regression Analysis.

On successful completion of this course, students are expected to **develop their skills in**:

- Procedures regarding interpretation and presentation of statistical data
- Analysing sampling probability distributions of industrial processes
- Formulating parametric approaches for estimating statistical parameters of industrial processes
- Interpretations of hypothesis tests and suggestions for improvement in the industrial context

On successful completion of this course, students are expected to **develop their appreciation of** and respect for **values and attitudes regarding the issues of**:

- Importance of Statistics as a tool to analyse, diagnose, verify, and develop industrial production

- Relevance of using Statistics in using available data to predict and analyse production variation in Industrial Processes

COURSE TEXTBOOKS

- Walpole RE, Myers R, Myers SL, Ye K, "Probability & Statistics for Engineers & Scientists", Global/9th ed., Pearson, (2016).

SUPPLEMENTARY READING

- Montgomery D C and Runger G C, "Applied Statistics and Probability for Engineers, 7th Ed." Wiley, 2019.

COURSE CONTENT & WEEKLY SCHEDULE

Week	Topics	Assessment Methods, %
WK1	Course Policy & Introduction and Fund. Concepts	Quizzes: 20% MT Exam: 35% Final Exam: 45%
WK2	Collection and Presentation of data	
WK3-4	Sampling Distributions and Data Descriptions	
WK5-7	Parametric estimation, interval estimation and properties of good estimators	
MTW1	Midterm Exams	
MTW2		
WK8-10	Tests of Hypotheses	
WK11-12	Correlation and Regression Analysis	
WK13	Introduction to Non-Parametric Statistics	
FW1	Final Exams	
FW2		

CONTRIBUTION OF THE COURSE TO MEETING THE REQUIREMENTS OF CRITERION 5

Mathematics and Basic Sciences: 1.5
Engineering Topic: 1.5
Other: 1

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES

	Level of Contribution		
Student Outcomes	**NO**	**Moderate**	**High**
1. an ability to identify, formulate, and solve complex problems by applying principles of engineering, science, and mathematics	☐	☐	☑
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	☑	☐	☐
3. an ability to communicate effectively with a range of audiences	☑	☐	☐
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	☑	☐	☐
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	☑	☐	☐
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	☐	☐	☑
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	☑	☐	☐

GRADING CRITERIA

Exams: All examinations will be based on lectures, tutorials, assigned readings, and other related work.

To pass these exams students will need to have studied the material well in advance in order to understand the concepts, procedures and techniques. All EMU, academic integrity, ethics and disciplinary procedures apply to all assessment activities of this course. Descriptions of these assessments are as following:

Quizzes: There will be 4 quizzes, dates of which will be announced.

Midterm Exam: There will be one midterm examination that covers all the material up to the date of the examination. It will be scheduled for a day in the designated mid-term exams week.

Final Exam: Like the midterm exam, the final exam will be scheduled for a day in the designated final exams week.

Make-up Exam: Make-up examination will only be offered to those students who missed the final or midterm exam and provided valid documentation (medical report etc.) for their absence within three days at the latest after the examination date.

METHOD OF ASSESSMENT

Although the student's overall grade will be based on the general assessment of the instructor, the following percentages may give an idea about the relative importance of various assessment tools:

Quizzes: 20%

Midterm Exam: 35%

Final Exam: 45%

Letter grade equivalents of numerical performances will be announced by the Registrar's Office after the last day for the submission of letter grades.

NG (Nil-grade) Policy: The following conditions **MAY** result in the student getting an NG grade from this course:

1. Not attending the Final Exam without a valid excuse.
2. Not attending the Midterm Exam without a valid excuse.
3. Cheating and/or plagiarism during the exams, and/or the quizzes.

LEARNING / TEACHING METHOD

The teaching/learning method adopted this semester will be in-class lectures, unless otherwise stated, as per the course of the COVID-19 pandemic. Tutorials will also be delivered, providing additional solved examples and other supplementary information as applicable. All relevant course materials will be provided via the course page implemented on MS Teams. The students will be provided with updates during the lectures and through posts on the course page on MS Teams and the LMS. The students are expected to regularly monitor the course page on MS Teams, and the LMS, and to regularly check their emails for updates.

DETAILED WEEKLY COURSE PLAN

Statistical Applications in Engineering Spring 2021/22 Term Plan					
Week	**Week Commencing**	**Slides**	**Module**	**Textbook Ref.***	**Complete**
WK1	28-Feb	L00 & L01	Course Policy & Introduction and Fund. Concepts	Chapter 1	
WK2	07-Mar	L02	Collection and Presentation of data	Chapter 1	
WK3	14-Mar	L03	Sampling Distributions and Data Descriptions	Chapter 8	
WK4	21-Mar	L03	Sampling Distributions and Data Descriptions	Chapter 8	Quiz 1
WK5	28-Mar	L04	Parametric estimation, interval estimation and properties of good estimators	Chapter 9	
WK6	04-Apr	L04	Parametric estimation, interval estimation and properties of good estimators	Chapter 9	
WK7	11-Apr	L04	Parametric estimation, interval estimation and properties of good estimators	Chapter 9	Quiz 2
MTW	18-Apr	**Midterm Exams**			
MTW	25-Apr				
WK8	02-May	L05	Tests of Hypotheses	Chapter 10	
WK9	09-May	L05	Tests of Hypotheses	Chapter 10	
WK10	16-May	L05	Tests of Hypotheses	Chapter 10	Quiz 3
WK11	23-May	L06	Correlation and Regression Analysis	Chapter 11	
WK12	30-May	L06	Correlation and Regression Analysis	Chapter 11	
WK13	06-Jun	L07	Introduction to Non Parametric Statistics	Chapter 16	Quiz 4
FW	13-Jun	**Final Exams**			
FW	20-Jun				

Course Textbook*

Walpole RE, Myers R, Myers SL, Ye K, “Probability & Statistics for Engineers & Scientists”, Global/9th ed., Pearson, (2016).

Supplementary Reading

Montgomery D C and Runger G C, “Applied Statistics and Probability for Engineers, 7th Ed.” Wiley, 2019.

ACADEMIC HONESTY, PLAGIARISM & CHEATING

This is intentionally failing to give credit to sources used in writing regardless of whether they are published or unpublished. Plagiarism (which also includes any kind of cheating in exams) is a disciplinary offence and will be dealt with accordingly. According to university by laws cheating and plagiarism are serious offences punishable with disciplinary action ranging from simple failure from the exam or project/report, to more serious action (suspension from the university for up to one semester). Disciplinary action is written in student records and may appear in student transcripts. Any act not suitable for a university student will not be tolerated and may lead to formal disciplinary action. Example of this are: getting someone else to take the examinations for you, misrepresentation of your own answer sheet as another’s work, cheating, knowingly assisting other students to cheat, abusing the tolerance or breaking the discipline of the class.