EASTERN MEDITERRANEAN UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF INDUSTRIAL ENGINEERING
COURSE OUTLINE
Fall 2023-24

COURSE CODE	IENG / MANE 385	**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)	Dr. Elnaz Gholipour	elnaz.gholipour@emu.edu.tr	IE-B101
ASSISTANT(S)	Negar Akbarzadeh Lalehlou (Tutorial) Sonia Rashidian (Tutorial)	negar.lalehlou@emu.edu.tr sonia.rashidian@emu.edu.tr	IE-B107 IE-B209

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 parametric and nonparametric 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 analyze, diagnose, verify, and develop industrial production

- Relevance of using Statistics in using available data to predict and analyze 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).
- Miller & Freund's, Probability and Statistics for Engineers, 9th Edition.

COURSE CONTENT & WEEKLY SCHEDULE

Week	Topics	Assessment Methods, %
WK1	Course Policy & Introduction and Cleaning Data	Quizzes: **20%** Project: **20%** MT Exam: **25%** Final Exam: **35%**
WK2	Descriptive Analysis	
WK3	Probability Distributions	
WK4	Normality checking and Normal distribution	
WK5	Parametric tests (Different t-tests, One way / two ways ANOVA). Hypothesis	
WK6		
WK7	Non- Parametric tests	
WK8	Non- Parametric tests	
WK9	Correlation Analysis	
WK10	Regression Analysis, reliability, and validity Analysis	
WK11		

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 follows:

Quizzes: Multiple choice and True/False type of questions (No make-up for quizzes)

Project: There will be different data sets for group work within the semester

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 exam 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% (Two quizzes, each 10% (26 of October & 14 of December))
Project: 20% (Four presentations- each one 5%)
Midterm Exam: 25%
Final Exam: 35%

There will be an extra grade for Class Participation for the students who attend sessions at 80% and above and have class activities.

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. Attendance less than 30%
2. 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.

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.