**EASTERN MEDITERRANEAN UNIVERSITY**

**DEPARTMENT OF INDUSTRIAL ENGINEERING**

**IENG385/ MANE385**

**STATISTICAL APPLICATION IN ENGINEERING**

**COURSE OUTLINE**

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| **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 |
| **PREPARED BY** |  Davood Forghani  | **SEMESTER / ACADEMIC YEAR** | Fall 2025-26 |
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|  |  **Name(s)** |  **E-mail** |  **Office** |
| **LECTURER(S)** | Davood Forghani |  davood.forghani@emu.edu.tr  | IE-B109  |
| **ASSISTANT(S)** | Aya Ezeddin | aya.ezeddin@emu.edu.tr | IE-B103 |
| **COURSE SCHEDULE** |  Tuesday 10:30-12:20 (IE-D203); Thursday 14:30-16:20  |
| **COURSE WEB LINK** |  |

**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.

**COURSE OBJECTIVES**

At the end of this course, the student will:

1. Identify, analyse, and apply key concepts of presenting and interpreting of statistical data (Student Outcome (SO): 1)
2. Identify, analyse, and apply probability distributions, in particular sampling distributions (SO: 1,6)
3. Identify, analyse, and apply key parametric estimation concepts in statistical engineering applications including interval estimation procedures (SO: 1,6)
4. Identify, analyse, and apply key hypotheses testing concepts in statistical applications (SO: 1,6)
5. Identify, analyse, and apply correlation and regression analysis for bivariate data (SO: 1,6)
6. Identify key nonparametric estimation approaches in statistical engineering applications (SO: 6)

**COURSE LEARNING OUTCOMES**

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

1. Presenting and interpretation of statistical data, (Course Objective (CO): 1,2)
2. Statistical Sampling Probability Distributions, (CO: 1,2)
3. Parametric, nonparametric and interval estimation procedures (CO: 3,4,6)
4. Hypotheses Testing, (CO: 3,4)
5. Correlation and Regression Analysis. (CO: 4,5)

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

1. Procedures regarding interpretation and presentation of statistical data (CO: 1,2)
2. Analysing sampling probability distributions of industrial processes (CO: 3,4)
3. Formulating parametric approaches for estimating statistical parameters of industrial processes (CO: 3,4,6)
4. Interpretations of hypothesis tests and suggestions for improvement in the industrial context (CO: 3,4,5)

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

1. Importance of Statistics as a tool to analyse, diagnose, verify, and develop industrial production (CO: 1.2.3,4)
2. Relevance of using Statistics in using available data to predict and analyse production variation in Industrial Processes (CO: 3,4,5,6)

**CONTRIBUTION OF THE COURSE TO MEETING THE REQUIREMENTS OF CRITERION 5**

 Mathematics and Basic Sciences : 3 Credit

 Engineering Topics : -

 Others : -

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES**

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| **Student Outcomes** | **Level of Contribution** |
| **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, labs, assigned homeworks and presentations. To pass these exams students will need to study the material well in advance in order to understand the concepts, procedures and techniques. To discourage last minute cramming, the instructor and the assistants will not answer any questions from students on the day of an examination. Exam results will be announced on the notice boards as soon as the exam papers are evaluated. Descriptions of these examinations are as follows:

Quizzes: There will be four quizzes that will be held on:

 Quiz1: Tuesday 14 October 2025

 Quiz2: Tuesday 04 November 2025

 Quiz3: Thursday 11 December 2025

*Midterm Exam:* There will be one closed-book/closed-notes midterm examination that covers all the material up to the date of the examination. The midterm exam may consist of two sections: multiple choice questions and problems. It will be scheduled for a day in the designated mid-term exams week.

*Final Exam:* The final examination will be a closed-book/closed-notes exam which will cover all the material studied throughout the semester and has the same structure as in the midterm examination. It will also be used to determine letter grades. Like the midterm exam, the final exam will be scheduled for a day in the designated final exams week.

*Term Project:* Students should form groups of 2-3 students. The data is provided by the groups and each group must work according to the project guide, if the project report is not submitted on time, a late submission penalty will be applied. Deadline to submit the term project is 29th December 2025.

*Make-up Exam*: **No make-up examination will be given to students who miss quizzes, and whose attendance is below 60%.** Make-up examination will only be offered to students who missed the final, midterm and lab exams and provided **adequate documentations** for the reason for their absence within five working days at the latest after the examination date. A student’s illness will only be accepted as a valid excuse if it is supported by a written report from the Health Centres.

*Resit Exams:* The resit examination will cover all the material studied throughout the semester and has the same structure as in the midterm and final examinations. This exam will be scheduled for a day in the designated resit exams week.

Note: The students need a calculator so they should bring their calculators to all lecture/tutorial/lab/exam hours.

**RELATIONSHIP WITH OTHER COURSES**

It is a complementary course of all the previously taken statistic and probabilistic courses especially for Probability and Statistical Methods (MATH322)

**LEARNING / TEACHING METHOD**

Teaching will be based on enabling the students to understand the concepts and procedures in each topic section and to be able to apply them. To do this the course will be organized into two modules: Lectures and Tutorials/Laboratory sessions. The students are required to study the related subjects of the week before coming to class. Sometimes four hours of class in a week will be used for lectures according to the perceived need. On the other hand, sometimes 2 hours of class in a week will be organized for lectures, 1 or 2 hours for Tutorials and/or Laboratory sessions.

*Lectures:* In lectures the instructor will attempt to summarize and explain only selected important concepts and points as clearly as possible. To be familiar with the material presented in lectures and participate in class discussions, students are expected to read the material covered in the previous lectures prior to the class meeting. Students will then find the lectures more interesting, and will benefit from the discussion if they come well prepared.

*Tutorials:* In addition to the regular lectures, there will be tutorial sessions conducted in the classroom by the assistants, according to the perceived need. In these hours the assistants will do extra example problems. Obviously, the best tutorials are those that meet the learning needs of students. The people who best understand your learning needs are you. Please contact the assistants regarding what you would like to see in the tutorials. Tutorial content will then be determined, and the tutorial date will be announced accordingly.

*Laboratory Work:* Throughout the semester, there will be several laboratory sessions, which will be conducted by the assistants, to do various computer exercises that require the use of Word, SPSS, together with general statistical Software available in the laboratory. Laboratory sessions will always be held in the Department’s PC Labs and their dates announced in advance. If you have any problem in these sessions, please try to resolve your problem with the assistants first.

*Office Hours:* The students’ timetables will be a base for determining appropriate time slots with zero clash (or minimum number of clashes) as much as possible. If students have difficulty in understanding any material after they have tried their best, they should consult their assistants and instructor during their office hours only. However, if you wish to meet the instructor outside of their office hours, please send an e-mail or a message on Teams first to make an appointment.

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| **ASSIGNMENTS**Besides the textbook material, there will be some reading assignments, which will support the lectures. For any type of examination, students are also responsible from studying all assigned readings, even if they might not be discussed in class. |
| **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 24 % Term project 16 % Mid-term Exam 25 % Final Exam 35 % TOTAL 100 pointsFor the students who apply for Resit Exam, the grade of this exam will be replaced by Mid-term and Final Exams grades, in total grade computation. Note that the instructor reserves the right to modify these percentages in case he finds it necessary. 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):** **Conditions that lead to NG (Nil-grade):**1. Not completing sufficient work that are included in the assessment of the course.
2. Not attending the **Final Exam** or its **Make-up Exam (Resit) without a valid excuse**.
3. Not attending the **Mid-term Exam** or its **Make-up Exam without a valid excuse**.
4. **Having an attendance to lectures/tutorials/labs less than 60%.**

**Objections:** Any form of document concerning work that is to be used by the instructor as the basis of grading will be shown to the student upon request, **within a week following the announcement of the grade**. The objection to any grade must be made to the assistants within that period. If, after an exam has been graded, you think an error was made in grading or you have questions about the grading of the material, please examine the exam solutions first, and then write your questions or comments on a separate sheet of paper and turn this paper to the assistants.**ATTENDANCE AND NG GRADE**Attendance will be taken every Lecture/Tutorial/Lab session. Note that EMU regulations allow instructors to give a grade of **NG** (Nil Grade) to a student whose absenteeism is more than 40% of the Lecture/Tutorial/Lab hours and/or who do not complete sufficient work that are included in the assessment of the course.**Credits COURSE TEXTBOOKS*** Helping Engineers Learn Mathematics Workbooks (HELM), Loughborough University

**SUPPLEMENTARY READING*** Richard A. Johnson, “Miller & Freund's Probability and Statistics for Engineers”, 9th edition, Pearson, (2023).
* Walpole RE, Myers R, Myers SL, Ye K, “Probability & Statistics for Engineers & Scientists”, Global/9th ed., Pearson, (2016).
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**COURSE CONTENT & WEEKLY SCHEDULE**

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| **Week** | **Topics** |
| Week1 | Course Policy & Introduction |
| Week2 | Descriptive Statistics |
| Week3 | Discrete Probability Distributions  |
| Week4 | Continuous Probability Distributions & Quiz1 |
| Week5 | The Normal Distribution |
| Week6 | Sampling Distributions and Estimation |
| Week7 | Quiz2, Lab &Tutorial |
| Week8 | Midterm Exams |
| Week9 |
| Week10 | Hypothesis Testing |
| Week11 | Goodness of Fit and Contingency Tables |
| Week12 | Regression and Correlation & Quiz3 |
| Week13 | Analysis of Variance |
| Week14 | Non-parametric Statistics |
| Week15 | Presentation |
| Week16 | Final Exams |
| Week17 |
| Week18 |

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| **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. |

**PLEASE KEEP THIS COURSE OUTLINE FOR FUTURE REFERENCE AS IT CONTAINS IMPORTANT INFORMATION!!!**