# Philadelphia University

Faculty of Engineering and Technology
Department of Mechanical Engineering

## Course Information

**Course Title:** Engineering Measurements (620344)

**Prerequisite:** Electric circuits

**Credit Hours:** 3 credit hours (16 weeks per semester, approximately 44 contact hours)

**Textbook:** **Experimental Methods for Engineers, J.P Holman, 8th edition, McGraw Hill, 2011.**

**References:** Mechanical Measurements, Thomas G. Beckwith, Roy D. Marangoni and John H. Lienhard V, Pearson Learning Solutions, 2009.

**Course Description:** This course is divided into three main parts: the starting part is a statistical concepts and calculations for theoretical and experimental data. The middle part concerns with the main basic circuit used to convert measured value to electrical signal and the last part includes the measuring instrument needed by mechanical engineer to measure a main physical variable such as flow, pressure, temperature, linear and angular velocities, forces and torques.

**Course requirements:** Computer, internet connection and webcam

**Instructor:** Laith R. Batarseh, MSc
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**Office**: Engineering building, room E61208, ext: 2135

## Course Topics:

| Week | Topic |
|---|---|
| **1** | Introduction to engineering measurements |
| **2+3** | Basics concepts |
| **4 - 6** | Analysis of Experiments data |
| **7+8** | Basic electrical measurements and sensing devices |
| **9+10** | Pressure measurements |
| **11+12** | Flow measurements |
| **13+14** | Temperature Measurements |
| **15** | Force and strain measurements |
| **16** | Review, and final exam |

## ABET Student Outcomes (SOs)

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| **1** | An ability to identify, formulate, and solve complex engineering 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 |

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| **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 |

## Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should be able to:

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|---|---|---|
| 1. | Learn some of the fundamental concepts related to engineering measurements | 1 |
| 2. | Be able to analyze experimental data | 1 |
| 3. | Be familiar to the basic electrical sensing and measuring devices | 1 |
| 4. | Understand the basic concepts of pressure, flow, temperature, force and strain measurement | 1 |
| 5. | Understand the physical and mathematical principle of measuring apparatus | 3,5 |

## Teaching methodology: Online, Blended or both

## Electronic platform: Microsoft-teams

## Evaluation methods:

Evaluation of student's performance (final grade) will be based on the following categories:

**Mid-term exam:** Shall be given at the end of the seventh week of the course in the form of multiple choice questions and (or) specific problems to be solved and uploaded by the student using the University electronic platform.

**Quizzes**: A number of 10-minute quizzes in the form of multiple choice questions or an assignment using the University electronic platform. will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).

**Homework**: Problem sets will be given to students in the form of assignments using the University Electronic platform. Homework should be solved by each student individually and submitted using the platform before the due date.

***Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero mark for that homework***

**Participation:** Questions will be asked during the online session (lecture) and the student is assessed based on his/her response

**Project:** One project will be assigned after the midterm exam where teams of students will be asked to choose one device not mentioned in the course, analyze its principle of work and share the data with other teams by the means of oral presentation.

**Final Exam:** The final exam will cover all the class material.

## Grading policy:

Mid-term Exam. 30%

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| Home works, Quizzes and participation | 30% |
| Final Exam | 40% |
| Total: | 100% |

## Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

March 2021