PHY 315 Introduction to Instrumentation

Summer 2024

Course Credits: 4
Contact Hours: 56 hours
Instructor: TBA
Email:TBA

COURSE OBJECTIVES

This course provides a comprehensive introduction to the principles and applications of instrumentation and computer systems in various engineering and scientific fields. Students will gain an understanding of the fundamental concepts related to sensors, data acquisition, signal processing, and the integration of computers in measurement and control systems. The course will cover both theoretical foundations and practical aspects, enabling students to apply their knowledge to real-world problems.

Upon Completion of this Course, students will be able to:

1. Understand the basic principles of instrumentation and the role of sensors in measurement systems;
2. Analyze and design simple measurement systems using various sensors;
3. Comprehend the fundamentals of data acquisition and signal processing techniques;
4. Demonstrate proficiency in using computer-based tools for data analysis and control;
5. Apply knowledge to solve engineering problems related to instrumentation and computers.

PREREQUISITES

None

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
5 Labs and Reports	45 Points
2 Quizzes	20 Points
Midterm Exam	15 Points
Final Exam	20 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

A ≥ 90 > B ≥ 80 > C ≥ 70 > D ≥ 60 > F.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Measurement and Instrumentation: Theory and Application, Alan S Morris, Reza Langari, Saint Louis: Elsevier Science & Technology, 2011,.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Fundamentals of Measurement Systems Topic 2: Static Characteristics of Instruments Topic 3: Dynamic Characteristics of Instruments Topic 4: Necessity for Calibration **Assessments:** Lab #1 Report #1

Module 2	**Topics:** Topic 5: Measurement Uncertainty Topic 6: Calibration of Measuring Sensors and Instruments Topic 7: Data Acquisition with LabVIEW Topic 8: Signal Processing with LabVIEW **Assessments:** Lab #2 Report #2 Quiz #1
Module 3	**Topics:** Topic 9: Electrical Indicating and Test Instruments Topic 10: Display, Recording, and Presentation of Measurement Data Topic 11: Variable Conversion Elements Topic 12: Measurement Signal Transmission **Assessments:** Lab #3 Report #3 Midterm Exam
Module 4	**Topics:** Topic 13: Intelligent Devices Topic 14: Measurement Reliability and Safety Systems Topic 15: Sensor Technologies Topic 16: Temperature Measurement **Assessments:** Lab #4 Report #4 Quiz #2
Module 5	**Topics:** Topic 17: Pressure Measurement Topic 18: Electronic Pressure Gauges Topic 19: Flow Measurement Topic 20: Level Measurement **Assessments:** Lab #5 Report #5 Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.
2) Assignments submitted in the wrong format will be counted as not submitted.
3) Failure to submit or fulfill any required course component results in failure of the class.
4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors

and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.