

Course Syllabus

MEC 316: Mechanical Engineering Laboratory I Fall 2017

Course Detail

Title	MEC 316: Mechanical Engineering Laboratory I (Sensors and Instrumentation)
Credit	2
Location	Lectures and Experiments: C605 (Solid Section), C606 (Fluid Section)
Meeting Times	Lectures: 9:00 – 9:53 AM, Wed; Experiments: 9:00 AM – 12:00 PM, Thu Fall 2017
Prerequisites	MAT 303 or AMS 361, PHY 134, MEC Major
Co-requisites	MEC 220 or ESE 271, MEC 214, MEC 301, MEC 364
Website	https://sites.google.com/site/AminFakhariSUNYK/teaching/mec316

Instructor Detail (Solid Section)

Instructor	Amin Fakhari, Ph.D.
Office	B620 Academic Building
Office Hours	Mon: 9:30 – 11 AM, Thu: 2 – 3:30 PM (and any other time by appointment)
Phone	+82-32-626-1816
Email	amin.fakhari@stonybrook.edu, amin.fakhari@sunykorea.ac.kr
Website	https://sites.google.com/site/AminFakhariSUNYK

Instructor Detail (Fluid Section)

Instructor	Si Won Hwang, Ph.D.
Office	B405 Academic Building
Office Hours	-
Phone	+82-32-626-1145
Email	siwon.hwang@sunykorea.ac.kr

Course Description

Students are introduced to a variety of sensors and instruments commonly used in mechanical engineering practice. The lectures provide background on the general principles of measurement systems and their performance characteristics. Measurements of different physical quantities will also be discussed in the class. The laboratory experiments provide hands-on experience in the use of several sensors and instruments that form the basis for the laboratory courses MEC 317 and MEC 417 where the use of these instruments is needed for more advanced experiments. Students are required to learn the basics of probability and statistics as well. Students shall:

- Learn to apply mathematics, physics, chemistry, and engineering principles to measurement problems in mechanical engineering;
- Design and conduct experiments and interpret data;
- Learn modern measurement techniques as applied to thermal and mechanical systems;
- Identify, formulate, and solve engineering problems;
- Learn to communicate effectively.

List of Experiments

Fluid Section

- Experiment 1: Temperature Measurement
- Experiment 2: Pressure and Velocity Measurement
- Experiment 3: Mass-Flow Measurement
- Experiment 4: Temperature Measurement from Hot Surfaces
- Experiment 5: LabVIEW Based Liquid Flow Control

Solid Section

- Experiment 6: Natural Vibration Modes of a Cantilever Beam
- Experiment 7: Straightness Measurement of Linear Motion
- Experiment 8: Strain Measurements
- Experiment 9: Calibration of a Linear Variable Differential Transformer
- Experiment 10: LabVIEW Based DC Voltage and AC Signal Measurements

Required Course Materials

Lab Manual	Hardcopy of Lab Manual will be distributed within the first two weeks of the semester.
LabVIEW Software Manual	Hardcopies of LabVIEW Manual are available to be used only in the labs. Its PDF file is also available on the course website .
MEC214 Lecture Notes	Hardcopy of Error Analysis and Linear Regression portion of SBU MEC214 lecture note will be given within the first two weeks of the semester.

Note: All other necessary materials will be posted on [Blackboard](#) or the [course website](#).

Assignments

- Pre-Lab Reports**
- Before you come to the laboratory, you must study the experiment you are going to perform from the lab manual and prepare a Pre-Lab Report. Instructor will sign your Pre-Lab Reports. Preparation of these reports are in line with SUNY Korea Flipped Learning Program.
 - Each student must prepare his/her own report.
 - You will not be allowed to start to do experiment in the laboratory until your Pre-Lab Report is ready.
 - Pre-Lab Report should contain
 - A brief description of the experiment objective,
 - List of equipment including manufacturer and model number,
 - Equations and any analytical calculations need for the experiment,
 - Empty tables for all data which is needed to be collected.
 - Each student should record neatly all data in his/her own report during the experiment. Even though the data is identical, it is useful when some data is not recorded by a student, there is a discrepancy in the data, or some data loses.

- Lab Reports**
- Students will form groups of three individuals to perform all experiments.
 - Each group must submit a single Lab Report for each experiment.
 - Each student must write at least three reports as the first author (combination of both Solid and Fluid sections).
 - All Lab Reports should be typed.
 - Reports must be submitted on Blackboard and also handed in at the beginning of the following session.
 - For submission on Blackboard, Submit both MS Word and PDF files of your report until the beginning of the following session. Please name both files as MEC316_Exp_#_Group_# (e.g., MEC316_Exp_6_Group_1). There is no need to include your Pre-Lab Reports and handwritten data for submission on Blackboard.
 - For handing in at the laboratory, attached the completed Pre-Lab Reports of all group members and also all handwritten data to the Lab Report.
 - For each day your Lab Report is late, its grade will be reduced by one point, regardless of who was the first author of the report. No exceptions will be made.
 - I will not accept your reports sent to my email address.

- Instrumentation Project** Design of a scale device will be defined as final project.

Reports Format

• Pre-Lab Reports

There is no need for Pre-Lab Reports to be typed but they should be prepared on white A4 sized papers and be stapled neatly in top left corner. Your name, date, course number, and experiment number should be written on the top of the first page.

• Lab Reports

All Lab Reports should be typed with a 12pt font. The required sections of the Lab Reports are listed in order of appearance as:

- A. **Title Page** (Including course number, experiment number and title, date, names of first author and group members)
- B. **Abstract** (A single short paragraph which represents the entire experiment including purpose of experiment, the variables to be measured, basic measurement concepts, etc.)
- C. **Introduction** (Including answering to these questions: why this experiment is important? what is the application of this experiment in engineering or real life? etc.)
- D. **List of Equipment** (Including manufacturer and model number from your Pre-Lab Report)
- E. **Experimental Theory** (Detailed description of the theoretical basis of the experiment including formulas, figures, etc.)
- F. **Experimental Procedure** (Detailed description of the steps performed during your experiment to obtain the required data. Description must be in paragraph form, not in steps and commanding form. Do not simply copy the steps from the Lab Manual)
- G. **Results** (Including calculation of experimental results, figures, tables, etc.)
- H. **Discussion** (Including discussing the trends in the results, comparison with theoretical predictions, etc.)
- I. **Error Analysis** (Discussion of error analysis, uncertainty of reported results, source of errors, methods for reducing the errors, etc.)
- J. **Conclusions** (A single paragraph which briefly describe the experiment and the discussed results)
- K. **References** (If you have any)
- L. **Appendices** (Pre-Lab Reports of all group members, handwritten calculations, codes, etc.)

Notes:

- Don't simply copy the sentences from the Lab Manual. Express the concepts in your own words.
- Be sure to check your spelling.
- Number all the pages.
- All equations should be numbered.
- All figures and tables must be labeled with a number and a caption.
- All the numerical quantities (in figures, tables, calculations, etc.) must have proper units.
- Use MS Excel or MATLAB for making graphs of your experimental data.
- Refer to figures and tables in the text as: Fig. # and Table #.

Grading

Lab Reports are graded on a scale of 0 to 10 as

Abstract	0.5
Introduction	0.5
List of Equipment	0.5
Experimental Theory	1
Experimental Procedure	1
Results	1.5
Discussion	1.25
Error Analysis	1.25
Conclusions	0.5
Pre-Lab Report	1
Writing/Style/Clarity	1

Semester letter grade will be based on the following assessments:

Lab Reports	80% (Each report: 8%)
Instrumentation Project	20%

Note: All group members will not necessarily receive the same grade for the course.

Grading Scale

Grading will not be on a curve. It will be absolute as follows:

A [100, 95]%	A⁻ (95, 90]%	
B⁺ (90, 85]%	B (85, 80]%	B⁻ (80, 75]%
C⁺ (75, 70]%	C (70, 65]%	C⁻ (65, 60]%
D⁺ (60, 56]%	D (56, 53]%	D⁻ (53, 50]%
F (50, 0]%		

Detailed Schedule

	Lecture Wednesday, 9:00 AM – 9:53 AM,		Laboratory Thursday, 9:00 AM – 12:00 PM	
Week 1	Course Overview, Lab Reports, Group Formation, Final Project, Safety	(Aug. 30)	Exp. 1-10 Overview	(Aug. 31)
Week 2			LabVIEW 1	(Sep. 7)
Week 3	Error Analysis	(Sep. 13)	LabVIEW 2	(Sep. 14)
Week 4			Exp. 1-10	(Sep. 21)
Week 5	Instrumentation Project	(Sep. 27)	Exp. 1-10	(Sep. 28)
Week 6			Exp. 1-10	(Oct. 12)
Week 8			Exp. 1-10	(Oct. 26)
Week 9			Exp. 1-10	(Nov. 2)
Week 10			Exp. 1-10	(Nov. 9)
Week 11			Exp. 1-10	(Nov. 16)
Week 12			Exp. 1-10	(Nov. 23)
Week 13			Exp. 1-10	(Nov. 30)
Week 13			Exp. 1-10	(Dec. 7)
Week 14			Exp. 1-10 (Complementary Session)	(Dec. 12)

Experiments Schedule for All Groups

	Fluid					Solid				
	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Exp. 5	Exp. 6	Exp. 7	Exp. 8	Exp. 9	Exp. 10
Week 4	Group1									
Week 5										Group1
Week 6		Group1								
Week 7									Group1	
Week 8			Group1							
Week 9								Group1		
Week 10				Group1						
Week 11							Group1			
Week 12					Group1					
Week 13						Group1				
Week 14	Complementary Session, if necessary									

Attendance Policy of SUNY Korea

1. All students of SUNY Korea are required to attend every class.
2. Unexcused absences will affect seriously the student's final grade in the course.
3. If a student has over 20% unexcused absence, the student's final course grade will be an 'F'.
 - (I) If the class is a 150 minute class, and is held once a week, the 4th unexcused absence of a student will lead to an F grade of the course.
 - (II) If the class is a 75 minute class, and is held twice a week, the 7th unexcused absence of a student will lead to an F grade of the course.
 - (III) If the class is a 50 minute class, and is held three times a week, the 10th unexcused absence of a student will lead to an F grade of the course.
 - (IV) In Intensive English Course (IEC), if a student misses the class more than 40 hours in a semester, the student will receive an F grade on the course.
4. Students should report the reason of absence to the instructor in advance, or immediately after the absence.
5. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
6. The instructor of the course reserves the right to excuse absences.
7. The course instructor may excuse the absence if the submitted documentation fulfills the conditions below.
 - (I) Extreme emergencies (e.g. death in the family)
 - (II) Severe medical reasons with doctor's note (Not a slight illness)
 - (III) Very important events (e.g. national conference, official school event)
8. At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

Disability Support Services (DSS) Statement:

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

In addition, this statement on emergency evacuation is often included, but not required: Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and One-Stop Service Center.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the [academic judiciary website](#).

Critical Incident Management Statement:

The State University of New York, Korea expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Subject to Change Notice

All material, assignments, and deadlines are subject to change with prior notice. It is your responsibility to stay in touch with your instructor, review the course site regularly, or communicate with other students, to adjust as needed if assignments or due dates change.

Syllabus Disclaimer

The instructor views the course syllabus as an educational understanding between the instructor and students. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes via email or in the course site Announcements. Please remember to check your SBU email and the course site Announcements often.