WORCESTER POLYTECHNIC INSTITUTE
MECHANICAL ENGINEERING DEPARTMENT
ENGINEERING EXPERIMENTATION

COURSE No.: ME-3901, D'2012
TEXTs: Required: *Experimental methods for Engineers, 8ed*
J.P.Holman, McGraw-Hill, 2012
Recommended: *LabVIEW ™2009*, Student Edition with CD
R. H. Bishop, Prentice Hall, 2010

INSTRUCTORS: *Cosme Furlong*
Office: HL-151, x 5126
Email: cfurlong@wpi.edu

Christopher Scarpino
Office: HL-153, x 4927
Email: cscarpino@wpi.edu

WEB PAGE: http://users.wpi.edu/~cfurlong/me3901.html
LECTURES: M and W, 1:00 PM, HL-218
SECTION MTG: 11:00-12:50 PM (D01),
1:00-2:50 PM (D02),
9:00-10:50 AM (D03), Tu and Th, HL-031
SUBJECT: Course outline
DATE: 12 March 2012

TA's: *Ivo Dobrev*
Office: HL-151, x 5125
Email: ivo_d@wpi.edu

Peter White
Office: HL-151, x 5125
Email: pawhite@wpi.edu

HOMEWORK

HOMEWORK IS ASSIGNED WEEKLY. Homework will be collected on Mondays, the week after it is assigned. Except April 16th, when homework will be collected on Tuesday.

All homework assignments are done by each individual without collaboration.

EXAMS

THERE WILL BE TWO (2) EXAMS: MIDTERM and FINAL. Exams will be closed books and closed notes.

All exams are done by each individual without collaboration, unless otherwise indicated.

LABORATORIES

THERE WILL BE FIVE (5) LABORATORY EXPERIMENTS. Each experiment requires laboratory efforts and the write-up of a report.

All laboratory preparations are done individually and jointly within small laboratory groups (2 students per group.)

Data analysis, reduction, and synthesis are done individually and jointly within small laboratory groups.

Each laboratory group completes the laboratory reports jointly. Laboratory reports are due **Wednesday**, the week after they are finished.

GRADING

The grade for the course will be based on: 20% FOR HOMEWORK, 20% FOR EXAMS, 50% FOR LABORATORY REPORTS, and 10 % FOR LABORATORY AND LECTURE PARTICIPATION AND ATTENDANCE.

NOTE: In all your work, state explicitly every assumption and/or approximation made, explain every procedure, and justify its use. Dimensional analyses are absolutely necessary. All results must be expressed in appropriate units. PLEASE, ALWAYS SHOW ALL WORK, while writing your results only on one side of the sheet(s) of paper; start each problem on a new sheet.

DATE	TOPICS
1.Mar 12, M	Course organization. Introduction.
Lec.	Units. Accuracy, precision, and resolution. Measurement systems, example. Introduction to LabVIEW.
2.Mar 13, Tu	LabVIEW Demo.
Lab.	Analog to digital conversion. **Lab #1: Digital Ohmeter.** Hardware setup for LabView.
3.Mar 14, W	Measurements. Transducers.
Lec.	Signal conditioning. Standards for measurements. Analog and digital signals. Significant digits.
4.Mar 15, Th	**Lab #1: Digital Ohmeter.**
Lab.	Write to file capability. Resistance measurement. Finish lab.
5.Mar 19, M	Error analysis.
Lec.	Least squares fitting.
6.Mar 20, Tu	**Lab #2: Pressure transducer calibration.**
Lab.	
7.Mar 21, W	Uncertainty analysis.
Lec.	Pressure measurements.
8.Mar 22, Th	**Lab #2: Pressure transducer calibration.**
Lab.	(Continued). Finish Lab.
9.Mar 26, M	Uncertainty analysis.
Lec.	Pressure measurements. (Continued).

10. Mar 27, Tu **Lab #3: Strain measurements.**
Lab. (Soda can experiment)

11. Mar 28, W Strain measurements. Bridge circuits.
Lec.

12. Mar 29, Th **Midterm exam.** Includes everything
Lab except strain.

13. Apr 02, M Strain measurements.
Lec. Bridge circuits (Continued). Curve fitting. Uncertainty analysis.

14. Apr 03, Tu **Lab #3: Strain measurements.**
Lab. (Soda can experiment)

15. Apr 04, W Strain gages. Mohr's circle. Rosettes. Bridge configurations.
Lec.

16. Apr 05, Th **Lab #3: Strain measurements.**
Lab. Strain gages: final calibration check and data recording (Soda can experiment).
Finish Lab.

17. Apr 09, M Strain gages. Bridge output and calibration.
Lec.

18. Apr 10, Tu **Lab #4: Vibration measurements.**
Lab. (Beam experiment)

19. Apr 11, W Dynamic response of structures. Motion transducers.
Lec.

20. Apr 12, Th **Lab #4: Vibration measurements.**
Lab. (Beam experiment)

21. Apr 16, M **Patriot's Day. No classes.**

22. Apr 17, Tu **Lab #4: Vibration measurements.**
Lab. (Beam experiment)

23. Apr 18, W Dynamic properties of beams. Motion transducers. MEMS inertial sensors.
Lec.

24. Apr 19, Th **Project Presentation day. No classes.**

25.Apr 23, M MEMS inertial sensors. Fourier analysis.
Lec.

26.Apr 24, Tu **Lab #4: Vibration measurements.**
Lab. Determination of elastic modulus
(Beam experiment)
Finish Lab.

27.Apr 25, W Temperature measurements. Uncertainty analysis.
Lec.

28.Apr 26, Th **Lab #5: Calibration of a Thermocouple.**
Lab. Finish Lab.

29.Apr 30, M Course review. Modern transducers.
Lec. Future directions.
State-of-the-art methodologies in experimental methods.

30.May 01,Tu **Final exam.** Includes everything.

---

* * *