1. Department, Course Number, and Course Title:

MECHANICAL ENGINEERING

ME 417 MACHINE ANALYSIS LAB

2. Designation:

Required	☐	Elective	☑
Lower Division	☐	Upper Division	☑

3. Course Description: Experimental analysis of steady state and transient characteristics of machine components and of complete machines.

4. Prerequisites: ME 321, ME 323

5. Text and Materials: No text. In class handouts from Instructor.

6. Course Objectives: Students will learn about the various devices and methods for making mechanical measurements, develop a fundamental understanding of current data acquisition techniques, and make mechanical measurements using actual machines.

Course Outcomes

- the ability to understand and to use the various means for making mechanical measurements.
- the ability to use and understand typical sensing devices used for the measurement of displacement, velocity, acceleration, force torque, and speed.
- the ability to employ electronic instrumentation and state-of-the-art data acquisition software in mechanical measurements.
- the ability to acquire and analyze data involving mechanical measurements of displacement, velocity, acceleration, force, torque, and speed, and to evaluate the accuracy of the data.

7. Topics Covered: (in Order of Presentation)

- Strain gages, sensor design and application.
- Experimental determination of moment of inertia.
- Experiment involving the motion and dynamics in a four-bar linkage.
- Theoretical analysis aspects of cams, kinematics and dynamics.
- Experiment involving the motion and dynamics of cams; eccentric, parabolic, SHM, and cycloidal.
- Experiment involving the balancing of a un-balanced rotor in its own bearing

8. Class Schedule:

Number of Sessions per week:	1
Duration of each session:	2 hour 50 minutes

9. Contribution of course to meeting the professional component:

This course is part of the 4 units of technical lab electives required for the mechanical engineering program.

Engineering Science	1 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (abet h)
- a knowledge of measurement techniques

Skill outcomes:

- an ability to design and conduct experiments as well as to analyze and interpret data (abet b)
- an ability to function on multidisciplinary teams (abet e)

- an ability to communicate effectively (abet g)
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (abet k)
- an ability to think in a logical sequential process

Attitudes Outcome:

- an understanding of professional and ethical responsibility (abet f)
- a desire to be a flexible and adaptable team player (collaborative attitude)

11. Prepared by: Adel Sharif 12/2005