COURSE NUMBER: VM 395	**COURSE TITLE:** Laboratory I
CREDIT: 4	**PREREQUISITES:** Vp240or Vp260, Vp241, Vm211, Vm235, and Vm240; preceded or accompanied by Vm320 and Vm382
TEXTBOOKS/REQUIRED MATERIAL: "Introduction to Engineering Experimentation," Wheeler A. J. and Ganji A. R. "Experimentation, Validation, and Uncertainty Analysis for Engineers," Colman H. W. and Steele W. G., (recommended reading)	**PREPARED BY:** Qiang Zhang and Kwee-Yan Teh **DATE OF PREPARATION:** Oct. 8, 2012 **DATE OF UC APPROVAL:** Oct. 30, 2013
INSTRUCTOR(S): Qiang Zhang and Kwee-Yan Teh	**SCIENCE/DESIGN:** n/a
CATALOG DESCRIPTION: Lectures and experiments designed to introduce the student to the basics of experimentation, instrumentation, data collection and analysis, error analysis, and reporting. Topics may include fluid mechanics, thermodynamics, mechanics, materials, and dynamical systems. Emphasis is placed on report writing and team-building skills.	**COURSE TOPICS:** 1. Laboratory safety and procedures 2. General measurement systems 3. Uncertainty Analysis 4. DAQ system and sampling 5. Properties of materials (Microscope structure, hardness, tensile tests) 6. Motor PID control and torque measurement 7. Solar panel & energy system 8. Wind tunnel measurements 9. Dimensional analysis 10. Engineering report and oral presentation skills
COURSE STRUCTURE/SCHEDULE: Lecture: twice per week, 90 minutes each; Laboratory: 1 per week, 3 hrs	
COURSE OBJECTIVES [Course Outcomes in brackets]	1. To provide the knowledge and hand-on experience to plan and conduct modern engineering experimentation, and to gain further understanding for some key concepts in various core ME courses. [1, 2, 3,4,5] 2. To provide the knowledge and experience needed to communicate ideas, progress, and results in a professional manner, including oral presentation and engineering report. [2,4,6] 3. To provide experiences working together as a team to accomplish a common goal. [7]
COURSE OUTCOMES [Program Outcomes in brackets]	1. Understand the general concept of a measurement system and estimate various kinds of errors that could occur during experimentations. [a] 2. Use statistics to analyze the results including uncertainty analysis. [b] 3. Use computer-data acquisition systems, temperature and flow measuring devices, tensile testing machines, strain-measuring devices, microscope, and wind tunnels. [b, k] 4. Have an increased understanding of the engineering concepts from fluid mechanics, materials, system control, and thermodynamics. [a, e] 5. Use similarity concepts for scaling experiments [a, b] 6. Be able to present the results and conclusions of an experimental project in a clear, logical, succinct, and informative written format.[g] 7. Work effectively and professionally together in diverse teams. [d]
ASSESSMENT TOOLS [Course Outcomes in brackets]	Team based and individual lab reports In-class assignments & Quiz Oral presentation Peer evaluations