COURSE NUMBER: Vm495	**COURSE TITLE:** Laboratory II
CREDIT: 4	**PREREQUISITES:** Vm395, preceded or accompanied by Vm350 and Vm360
TEXTBOOKS/REQUIRED MATERIAL: "Introduction to Engineering Experimentation," Second Edition, by A. J. Wheeler and A. R. Ganji (Pearson Education Inc)	**PREPARED BY:** David Hung **DATE OF PREPARATION:** Aug 03, 2012 **DATE OF UEC APPROVAL:** Oct. 30, 2013
INSTRUCTOR(S): David Hung + one technical communications instructor	**SCIENCE/DESIGN:** n/a
CATALOG DESCRIPTION: Design, construction, and operation of extended experimental projects related to mechanical systems. Weekly engineering lectures focus on theoretical and applied experimental methods, and technical communication. Project topics may include modern data acquisition system, sensors and actuators, controls, heat transfer, fluid mechanics, thermodynamics, mechanics, materials, and dynamical systems. Weekly technical communication lectures emphasize on writing technical and research report, oral presentations, team-building skills, and the design of experiments.	**COURSE TOPICS:** 1. General experimental design (3 hrs) 2. Experimental equipment and measurement tools (7.5 hrs) 3. Statistical experimental methods (6 hrs) 4. Teamwork (3 hrs) 5. Documentation needed for experimental studies (13.5 hrs) 6. Oral reports and presentations (9 hrs) 7. Hands-on experimental experiences (lab) a. Household electrical appliance and flow experiment b. Open experiment proposed by students
COURSE STRUCTURE/SCHEDULE: Lecture: three times per week, two 90-minute lectures and one 45-minute lecture; Laboratory: 1 per week, 3 hrs	

COURSE OBJECTIVES [Course Outcomes in brackets]	1. To provide the knowledge and experience necessary to plan, design, build, and conduct high-quality, efficient experiments, and to thoroughly analyze the results. [1, 2, 3, 8, 9, 10, 11] 2. To provide the knowledge and experience needed to communicate ideas, progress, and results to others in an easy-to-understand and professional manner, and in multiple ways (oral, written, and graphical). [4, 5, 6] 3. To provide experiences working together as a team to accomplish a common goal. [7]
COURSE OUTCOMES [Student Outcomes in brackets]	After completing Vm495, students should be able to: 1. Create a proposal for an experimental program. [b, e, g] 2. Plan an experimental program including budget, schedule, and test matrix. [b, c] 3. Construct and conduct experiments based on the plan. [a, b, c, d, e, f, k] 4. Be able to use a variety of industrial and scientific formats to present the results and conclusions of an experimental project in a clear, readable, succinct, and informative written format [g] 5. Present a plan, progress report, and final report for an experimental project in an oral form [g] 6. Present the results of an experimental project in a poster format suitable for peers, advisors, and industry representatives [g, f] 7. Work effectively and professionally together in diverse teams.[d, f, g] 8. Understand the general concept of a measurement system and the kinds of errors that can occur in making measurements. [a, b, k] 9. Know how to use modern computerized data acquisition equipment. [b, k] 10. Understand different ways to measure solid-mechanical quantities (strain, displacement, velocity, acceleration, force, torque), pressure, temperature, humidity, and fluid quantities (flow, velocity, and level). [a, b, k] 11. Use statistics to design efficient experiments and analyze the results including uncertainty analysis. [a, b, e, k]
ASSESSMENT TOOLS [Course Outcomes in brackets]	Homework [2, 8, 9, 10, 11] Final Exam [8, 9, 10, 11] Written reports [1, 2, 3, 4] Oral reports [5] Poster presentation [6] Peer evaluations [7]