## MECH 490L: Mechanical and Thermal Systems Laboratory (1 credit)

This course introduces students to data acquisition theory, instrumentation, sensors, data reduction, statistical and uncertainty analysis, and experiment design. The concepts of designing, performing, and reporting experiments on mechanical and thermal systems, mechanisms, vibrations, structures, thermodynamics, and heat transfer are also introduced. (Prerequisite: MECH 350, and MECH 452)

**Course Learning Outcomes:**

By the end of the course, students will be able to:

A1. Demonstrate a comprehensive understanding of data acquisition theory, instrumentation, sensors, data reduction, statistical and uncertainty analysis applied to different systems.

A2. Acquire an understanding of the theoretical principles and methodologies employed in the experimental examination of diverse mechanical engineering systems.

B1. Apply theoretical concepts learned in the course to design, execute, and analyze experiments on diverse mechanical and thermal systems.

B2. Perform hands on experience to set key parameters of different mechanical devices.

B3. Prepare clear and concise experiment reports by employing appropriate technical language, visual aids, and documentation standards commonly used in the field of mechanical and thermal systems.

C1. Actively perform the lab experiments individually as well as in team in order to analyze the open-ended projects on the basis of principles of fluid mechanics.

**Course Learning Resources:**

* Manoj Kumar Rout, “Lab manual for Fluid Mechanics and Hydraulic Machines” BT University, 2008**.**
* Dr. N. Kumar Swamay, “Fluid Mechanics and Machinery Laboratory manual”, Charator publications.
* Josué Njock Libii, Introduction to Fluid Mechanics: A Laboratory Manual, available to students electronically on WebCT/Blackboard**.**

**Course Content:**

1. Process of Measurement
2. Standards and Dimensional Units of Measure
3. Heat Exchangers.
4. Vapor Cycle
5. Heating, Ventilation, and Air Conditioning
6. Gas Cycle
7. Vibration Analysis