A. **TITLE:** Mechatronics laboratory II

B. **COURSE NUMBER:** MKTX 370

C. **CREDIT HOURS:** 1

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   3 hours Laboratory/week

H. **CATALOG DESCRIPTION:**
   This mechatronics laboratory emphasizes the applications of analog electronics, digital electronics, sensors and transducers, actuators, and microcontrollers. Laboratory experiments are designed to give the student hands-on experience with components and measurement equipment used in the design of mechatronic products. Design and construction of mechatronics systems are emphasized.

I. **PRE-REQUISITES/CO-REQUISITES:**
   a. Pre-requisite(s): MKTX 320
   b. Co-requisite(s): MKTX 325

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>ABET</th>
<th>Institutional SLO</th>
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<tbody>
<tr>
<td>1. Distinguish the basic elements underlying electrical systems: analog and digital electronics.</td>
<td>b, d, g, k</td>
<td>3. Professional Competence</td>
</tr>
<tr>
<td>2. Use sensors, actuators, microcontrollers, and embedded software in mechatronics applications.</td>
<td>b, d, g, k</td>
<td>3. Professional Competence</td>
</tr>
<tr>
<td>3. Apply control systems in mechatronics projects</td>
<td>b, d, g, k</td>
<td>3. Professional Competence</td>
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</tbody>
</table>

K. **TEXTS:** The Next Step in Training in Mechatronics Technologies, Lab-Volt Systems, Inc. Farmingdale, NJ 07727

L. **REFERENCES:** None

M. **EQUIPMENT:**

**MKTX 370 – MECHATRONICS LABORATORY II**
N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:**
   - Lab practical
   - Lab-reports
   - Projects
   - Participation & Team Work

P. **DETAILED COURSE OUTLINE:** None

Q. **LABORATORY OUTLINE:**

Design and testing of fluid power circuits to control (i) velocity (ii) direction and (iii) force of single and double acting actuators.

Design of circuits with logic sequence using Electro pneumatic trainer kits.

Simulation of basic Hydraulic, Pneumatic and Electric circuits using software.

Circuits with multiple cylinder sequences in Electro pneumatic using PLC.

Speed Control of AC & DC drives.

Servo controller interfacing for DC motor.

Proportional–Integral–Derivative (PID) controller interfacing.

Stepper motor interfacing with microcontroller (i) full step resolution (ii) half step resolution.

Modeling and analysis of basic electrical, hydraulic and pneumatic systems using LAB VIEW.

Computerized data logging system with control for process variables like pressure flow and temperature.