STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
MKTX 310 – Instrumentation and Controls

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Department: Mechatronics Engineering Technology

Semester/Year: Fall/2018

A. **TITLE**: Instrumentation and Controls

B. **COURSE NUMBER:** MKTX 310

C. **CREDIT HOURS: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)**

 # Credit Hours: 3
 # Lecture Hours: 3 **per week**
 # Lab Hours: **per week**
Other: **per week**

Course Length: 15 **Weeks**

D. **WRITING INTENSIVE COURSE**: Yes ☐ No ☒

E. **GER CATEGORY: None:** ☒ **Yes:** GER
***If course satisfies more than one*:** GER

F. **SEMESTER(S) OFFERED: Fall** ☐ **Spring** ☒ **Fall & Spring** ☐

G. **COURSE DESCRIPTION:**

This course will introduce instrumentation systems, process measurements, and process control. Specifically, the course will discuss measurement terminology, differentiating between analog and digital, describe the instrumentation used for electronic testing and develop the principles of operation of transducers used for process measurement and control.

H. **PRE-REQUISITES: None** ☐ **Yes** ☒ **If yes, list below:**

ENGS 263/264 Electric Circuit/Laboratory

CO-REQUISITES: None ☒ **Yes** ☐ **If yes, list below:**

I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
Understand the fundamentals of system monitoring and measurement via system elements (sensors)	a, b, k		2-Crit Think ISLO ISLO	Subsets Subsets Subsets Subsets
Understand the presentation and real-time/post-process analysis of data sets obtained via system sensors	a, b, k		2-Crit Think 3-Found Skills ISLO	CA IA IM Subsets
Understand the fundamentals of control theory and the types of control systems.	a		2-Crit Think ISLO ISLO	CA IA Subsets Subsets
Understand the transfer function and block-diagram models used in the creation of a control loop.	a, k		2-Crit Think ISLO ISLO	CA IA Subsets Subsets
Understand and investigate system response, frequency response, and system stability.	a, c, k		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets
Design controllers using Ziegler-Nichols tuning, Root-Locus method, and other conventional techniques.	a, c, k		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets
Generate and analyze Nyquist diagrams and Bode plots.	a, c, k		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA IA PS Subsets

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit,/Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

J. APPLIED LEARNING COMPONENT: Yes ☒ No ☐

If YES, select one or more of the following categories:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. TEXTS:

Nise, Norman. "Control Systems Engineering", 7th Edition, Wiley

L. REFERENCES:

N/A

M. EQUIPMENT: None ☐ **Needed:** Computers with MatLab and Simulink

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

- **Homework**
- **Tests, Quizzes**
- **Projects**

P. DETAILED COURSE OUTLINE:

Measurement Systems
- **Instrumentation System Elements (sensors)**
- **Data Presentation Elements**
- **Control Systems**

Process Controllers
- **Correction Elements**
- **Programmable Logic Control Systems**
- **System Models**
- **Transfer Function**
- **State Space Models**
- **System Response**
- **Frequency Response**
- **Nyquist Diagrams**
- **Bode Plots**
- **Ziegler-Nichols Tuning**
- **Root Locus Method**

Q. <u>LABORATORY OUTLINE</u>: None ☒ Yes ☐