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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
MECH 332 – Intermediate Machine Design

Created by: Daniel Miller

Updated by:

Canino School of Engineering Technology

Department: Mechanical & Energy Technologies

Semester/Year: Fall 2018

A. **TITLE**: Intermediate Machine Design

B. **COURSE NUMBER:** MECH 332

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 is a continuation of MECH 232 – Machine Design. Design of shafts, keys, couplings and seals provide application to tolerances and fits. The study of bearing types, loads, design life and selection along with fastener selection, machine frames, connection and joints; linear motion, motion control and electric motors and controls used in automated machinery.

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

MECH 232

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***	
1. Design shafts using keys, couplings and seals			5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
2. Apply design tolerances for acceptable fits and failure analysis			5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
3. Select the proper bearings for application and loading			5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
4. Specify the proper fastener and connection type for common mechanical assemblies			5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
5. Choose applications and specify components requiring motion control			5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
6. Research and site examples of failed social and ethical mechanical design applications			4-Soc Respons ISLO ISLO	Subsets Subsets Subsets Subsets

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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**

*Include program objectives if applicable. Please consult with Program Coordinator

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:

Mott, Robert L. (2013). Machine Elements in Mechanical Design (5th Edition) Prentice-Hall, Inc.

L. REFERENCES:

Machinery's Handbook, 27th edition, Industrial Press, 2000

M. EQUIPMENT: None ☒ Needed:

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Exams, Homework, Design Project

P. DETAILED COURSE OUTLINE:

I. Keys, Couplings and Seals
- **A. Uses and materials for keys**
- **B. Stress analysis in keys**
- **C. Application and uses of couplings and U-joints**
- **D. Retaining rings and stress analysis**
- **E. Type of seals and materials used**

II. Tolerances and Fits
- **A. Factors that affect tolerances and fits**
- **B. Cost associated with tolerance specification**
- **C. Clearance, interference, transitional fits**
- **D. Stresses due to force fits**

III. Bearing Types and Selection

- **A. Type of bearings (roller, thrust, surface)**
- **B. Bearing Materials**
- **C. Bearing mounts**

D. **Load/Life relationship**
E. **Bearing selection**
F. **Lubrication requirements**
G. **Design considerations**

IV. Fasteners and Connections

A. **Materials, designation and selection of fasteners**
B. **Fastener strength and clamping loads**
C. **Eccentrically loaded bolted joints**
D. **Machine frames and structures**
E. **Welded joints**

V. Springs

A. **Type of springs**
B. **Stresses and deflection**
C. **Improving spring performance**
D. **Applications**

VI. Linear Motion and Controls

A. **Power screw and ball screw systems**
B. **Clutches and brakes**
C. **Acceleration and inertia**
D. **Heat dissipation**
E. **Motors and Controls**

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