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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CONS172 – TECHNICAL STATICS

Created by: JFR

Updated by: JFR

Canino School of Engineering Technology

Department: CIVIL and CONSTRUCTION TECHNOLOGIES

Semester/Year: FALL/2018

A. **TITLE**: TECHNICAL STATICS

B. **COURSE NUMBER:** CONS172

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

Credit Hours: 3
Lecture Hours: (2) one-hour lectures **per week**
Lab Hours: (1) two-hour lab **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:**

The course provides application of Newton's First and Third Laws of motion in the force analysis of statically determinate structures such as pinned connections, trusses, beams, frames, and cables. The determination of centroids and moment of inertia is also covered. The course requires extensive application of geometry, trigonometry and algebra. The course provides fundamentals that are used in strength of materials and structural analysis

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

MATH 123 (Pre-Calculus) and PHYS 121 (College Physics I); More advanced MATH or PHYS may be substituted.

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*	
Calculate the total moment about a point created by a system of coplanar forces acting on a rigid body.	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Draw and label free body diagrams clearly and accurately.	1a, 2abc, 4ab, 6ab, 7c		5-Ind, Prof, Disc, Know Skills 1-Comm Skills ISLO	Subsets W Subsets Subsets
Apply the equations of equilibrium to determine the unknowns in a system of concurrent forces.	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Analyze the member forces in a truss using the method of joints.	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Analyze the member forces in a truss using the method of sections	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Determine the forces in the members of a rigid structural frame.	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets

Determine the centroid of composite sections and built up sections	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Calculate the Moment of Inertia of composite sections and built-up sections.	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
Apply the equations of equilibrium in determining the reactions at the supports of statically determinate, two-dimensional structures such as beams, trusses and frames.	1a, 2abc, 4ab, 6ab		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
			ISLO ISLO ISLO	Subsets Subsets Subsets 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**

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

K.   **TEXTS:**

Statics and Strength of Materials, Cheng, Glencoe Publishing

Statics and Strength of Materials, Onouye, Pearson

Applied Statics and Strength of Materials, Limbrunner and Spiegel, Pearson Prentice Hall
    Publishing

L.   **REFERENCES:**

NONE

M.   **EQUIPMENT: None** ⊠   **Needed:**

N.   **GRADING METHOD:** A - F

O.   **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

HOMEWORK 25%, EXAMS 75 %

P.   **DETAILED COURSE OUTLINE:**

Review of essential math requirements
a.   **Units of linear measure, force, moment and stress (US and SI)**
b.   **Unit conversions**
c.   **Trigonometry**
i.   **Law of Sines**
ii.   **Law of Cosines**
iii.   **Pythagorean theorem**
iv.   **Right triangle trig**
v.   **Similar triangles**
d.   **Algebra**
i.   **Solving simultaneous equations**
ii.   **Writing equations to model a structural system**

II.   **Review of Vector Physics**

a. **Definition of vector and scalar quantities**
b. **Force vectors**
c. **Addition of vectors**
d. **Resultant of concurrent force systems**
e. **Resolution of a force into rectangular components**

III. **Rotational effects of a force**
a. **Definition of a moment**
b. **Units**
c. **Sign convention**
d. **Calculation of the moment of a force**
e. **Addition of moments caused by a force system**
f. **Varignon's theorem**
g. **Force Couples**
h. **Resultant of distributed loads**

IV. **Equilibrium**
a. **Equilibrium equations**
b. **Drawing free body diagrams**
c. **Assigning reactions at supports**
d. **Two Force members**
e. **Solving for unknown forces in concurrent, coplanar force systems**
i. **Cables**
f. **Solving for unknown forces in non-concurrent, coplanar force systems**
i. **Beam reactions**
ii. **Frame reactions**
g. **Distributed Loads**
h. **Principle of superposition**

V. **Analysis of structures, forces in members**
a. **Truss Analysis**
i. **Method of Joints**
ii. **Method of Sections**
b. **Frame Analysis**

VI. **Centroids**
a. **Center of Gravity**
b. **Center of Area**
c. **Centroids by Composite shape method**

VII. **Moment of Inertia**
a. **I – defined (2nd moment of the area about an axis)**
b. **I by formula definition**
c. **I by common shape**
d. **I by composite shape, parallel axis theorem (transfer formula)**

VIII. **Friction (optional**

Q. **LABORATORY OUTLINE: None ☒ Yes ☐**