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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CONS 101 – Elementary Surveying

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Canino School of Engineering Technology

Department: Civil and Environmental Technology

Semester/Year: Fall 2018

A. **TITLE**: Elementary Surveying

B. **COURSE NUMBER:** CONS 101

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

 # Credit Hours: 4
 # Lecture Hours: 3 **per week**
 # Lab Hours: 3 **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:**

Course consists of both lecture and laboratory periods. Lectures include the developmental history of the surveying profession, along with the underlying principles of basic theory and practice. Realistic exercises involving linear and angular measurements, leveling, field-book recording, construction layout, and traversing are performed in the outside laboratory. Computation of errors, adjustments for instrument misalignment and weather are included in the laboratory exercises. Conversion of measurements and use of the Metric (S.I.) system is also included. Students have ample opportunity for hands-on training with the extensive variety of equipment utilized in the course. Field parties of limited size offer "one on one" instruction opportunity

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

Technical Math (MATH 135)

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

pre-Calculus (MATH 123) or higher, OR permission from instructor.

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***	
a. measure the elevation difference between two points using an engineer's level and rod. This will include computation of closure error, error adjustments and determination of order of accuracy.	2488:1b,2a 517: 162:		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	PS Subsets Subsets Subsets
b. record a set of neat and legible field notes for a given set of surveying data in accordance with provided format specifications.	2488: 1a,7a 517: 162:		5-Ind, Prof, Disc, Know Skills 1-Comm Skills 1-Comm Skills	Subsets O W Subsets
c. use a surveyor's tape, plumb bob, taping pins and hand level to measure the horizontal distance between two points on a slope	2488: 1b 517: 162:		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
d. calculate equivalent measurements in different surveying unit systems.	2488: 1a,2a 517: 162:		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
.e. calculate corrections to tape measurements for temperature, tape length and slope.	2488: 1a,2a,6a 517: 162:		2-Crit Think 5-Ind, Prof, Disc, Know Skills ISLO	CA Subsets Subsets Subsets

f. demonstrate the ability to measure and lay out horizontal and vertical angles with a total station. This will include the ability to set up the instrument over a point and level it	2488: 1a,5a,5b 517: 162:		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
g. Calculate the true direction of a line using a magnetic compass direction measurement and current declination	2488: 1b,2a,3a 517: 162:		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
h. calculate the area of a parcel of land in acres given the length of the sides (straight or curved) in a variety of units.	2488: 1a,2a 517: 162:		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
i. calculate the coordinates of the points of a closed polygon traverse. As part of this the student will compute and/or convert bearings and azimuths; determine relative precision and accuracy; and adjust angles and distances to provide proper closure of the traverse	2488: 1a,2a,5a,5b,6a 517: 162:		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
j. function successfully as a member of a field party, both subordinate and leader	2488: 5a,5b 517: 162:		5-Ind, Prof, Disc, Know Skills 4-Soc Respons ISLO	Subsets T 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
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. TEXTS:

Construction Surveying, and Layout, 3rd Edition, Wesley G. Crawford, Creative Construction, 2720 S. River Rd, West Lafayette, IN, 2003. ISBN 0-9647421-1-X.
Elementary Surveying Project Manual, Ross C. Hudson, Thomas Dalton and Robert R. Blickwedehl, Most recent Edition.

L. REFERENCES:

none

M. EQUIPMENT: None ☐ **Needed:** Automatic Level, Total Station, Prism Pole, Metal Detector, Steel Tape, Range Pole, Engineering Rod (Leveling), Miscellaneous Hand Equipment are provided by the department.

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

- **Exams**
- **Homework Assignments**
- **Lab Participation**
- **Field Book preparation and maintenance**
- **Lab Calculation and mapping projects**

P. DETAILED COURSE OUTLINE:

I. Introduction

II. Theory of Measurement & Errors
A. Types of Measurements Used in Surveying
B. Units
C. Significant Figures
D. Rounding Off Numbers
E. Errors and Error Propagation
F. Precision and Accuracy

III. Surveying Notes
A. Requirements
B. Sample Arrangements

IV. Legal Implications

V. Distance Measurement by Taping
A. Measuring Horizontal Distances
B. Pacing
C. Level Taping
D. Slope Taping
E. Stationing
F. Corrections

VI. Theory, Methods and Equipment - Leveling
A. Leveling Methods
B. Equipment
C. Field Procedures
D. Differential Leveling
E. Reciprocal Leveling
F. Profile Leveling
G. Cross Sectioning
H. Precision
I. Adjustment of Leveling Loop
J. Errors and Mistakes
1. Curvature and Refraction

VII. Angles, Bearings and Azimuths
A. Units
B. Horizontal Angles
C. Bearings
D. Azimuths
E. Comparison and conversion of Bearing and Azimuths
F. Computing Bearings and Azimuths

VIII. Magnetic Compass
A. Introduction
B. Magnetic Declination
C. Variations in Magnetic Declinations
D. Types of Compasses
E. Compass Problems

IX. Total Station
A. Basic Parts
B. Scales and Verniers
C. Reading Angles
D. Field Operations
E. Setup and adjustments
F. Bearings and Angles
G. Closing the Horizon
H. Deflection Angles
I. Errors, Mistakes and Corrective Measures

X. Traversing
A. Traverse Angles
B. Traverse Distances
C. Traverse Stations
D. Note Keeping
E. Angle Misclosure

XI. Traverse Computations
A. Balancing Angles
B. Computation of Bearings, Azimuths, Latitudes and Departures
C. Closure Conditions
D. Adjustments
E. Coordinates
F. State Plane Coordinates
G. Sources of Error

XII. Area
A. Methods of Area Measurements
B. Offset method
C. Area of a circular segment
D. Error in area computation

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

1. Introduction, Pace Length and Prolonging a Line
2. Level Loop I
3. Level Loop II
4. Reciprocal Leveling Project
5. Horizontal and Slope Taping
6. Profile and Cross Section Leveling
7. Angles of Triangle by Taping and Calculations
8. Introduction to Total Station
9. Closing the Horizon
10. Building Layout
11. Total Station Dexterity Test
12. Closed Traverse - Field Problem
13. Closed Traverse – Computations
14. Measuring the Height of an Inaccessible Object