

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE:** SURVEYING

**CODE NO. :** SUR101 **SEMESTER:** ONE

**PROGRAM:** CIVIL ENGINEERING TECHNICIAN

**AUTHOR:** SAL IENCO

**DATE:** SEPTEMBER 2016 **PREVIOUS OUTLINE DATED:** SEPTEMBER 2015

**APPROVED:** *“Corey Meunier”*  
CHAIR

**TOTAL CREDITS:** FOUR

**PREREQUISITE(S):** NIL

**HOURS/WEEK:** FOUR

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Technology & Skilled Trades  
(705) 759-2554, Ext.2610**

## I. COURSE DESCRIPTION:

Surveying plays a key role with our built environment. As a civil technician you may have responsibilities at the initial planning, layout or construction phases of a project.

This course introduces you to basic surveying principles. The topics will deal with theory, application and care of the level, distance measurement equipment and total station/theodolite. The theory is enhanced with practical field exercises.

## II. LEARNING OUTCOME:

1. Use survey instruments to collect and provide data for engineering/construction projects.
2. Adhere to applicable health and safety related legislation and practices.
3. Demonstrate relevant mathematical, computer and technical problem solving skills as it relates to civil engineering / construction projects

## III . TOPIC OUTLINE

Outcome	Topic and Content	Reading	Week
1,2,3	<b>1. Introduction to Surveying</b> <ul style="list-style-type: none"> <li>• Brief history of surveying</li> <li>• Surveying defined</li> <li>• Types of surveys</li> <li>• Surveying instruments</li> <li>• Field procedure for setting up a level</li> <li>• Activity setting up a level</li> </ul>	<i>LMS</i> <i>Module 1:</i> <i>Lesson 1</i>  Chapter 1	1
1,2,3	<b>2. Accuracy and Precision/Introduction to Leveling</b> <ul style="list-style-type: none"> <li>• Definitions of accuracy and precision</li> <li>• Errors and mistakes in surveying</li> <li>• Classification of errors</li> <li>• Field book set up – data collection</li> <li>• Basics of surveying leveling</li> <li>• Leveling equations</li> <li>• Classroom activity</li> <li>• Field Exercise 1 – Leveling using one set up</li> </ul>	<i>LMS</i> <i>Module 1:</i> <i>Lesson 2</i>  <i>Module 2:</i> <i>Lesson 1</i>  Chapter 1 Chapter 4	2

1,2,3	<b>3. Differential Leveling</b> <ul style="list-style-type: none"> <li>• Theory of differential leveling</li> <li>• Turning points</li> <li>• Field notes for differential leveling</li> <li>• Classroom activity</li> <li>• Field Exercise 2 – Differential leveling</li> </ul>	<i>LMS</i> <i>Module 2:</i> <i>Lesson 2</i>  Chapter 4	3
1,2,3	<b>4. Benchmark Leveling</b> <ul style="list-style-type: none"> <li>• Theory of benchmark leveling</li> <li>• Field notes for benchmark leveling</li> <li>• Variation on benchmark leveling</li> <li>• Classroom activity</li> <li>• Field Exercise 3 – Benchmark leveling</li> <li>• Assignment 1</li> </ul>	<i>LMS</i> <i>Module 2:</i> <i>Lesson 3</i>  Chapter 4	4
1,2,3	<b>5. Profile Leveling and Grade Lines</b> <ul style="list-style-type: none"> <li>• Theory of profile leveling</li> <li>• Field notes for profile leveling</li> <li>• Stations</li> <li>• Ascending and descending grades</li> <li>• Grade line calculations</li> <li>• Classroom activity</li> <li>• Field Exercise 4 – Profile Leveling</li> </ul>	<i>LMS</i> <i>Module 2:</i> <i>Lesson 5</i>  Chapter 4	5
	<b>6. Mid-term Practical Test/Accuracy Precision</b> <ul style="list-style-type: none"> <li>• Standards of accuracy</li> <li>• Accuracy and precision calculations</li> <li>• Classroom activity</li> <li>• Practical leveling test</li> </ul>	<i>LMS</i> <i>Module 2:</i> <i>Lesson 4</i>  Chapter 4	6
1,2,3	<b>7. Mid-term Theory Test/Measurement of Distances</b> <ul style="list-style-type: none"> <li>• Pacing</li> <li>• Odometers</li> <li>• Stadia</li> <li>• Electronic distance measurement instruments</li> <li>• Classroom activity</li> <li>• Field Exercise 5 - Pacing</li> </ul>	<i>LMS</i> <i>Module 3:</i> <i>Lesson 1</i>  Chapter 3	7
1,2,3	<b>8. Tape Measurement Procedures</b> <ul style="list-style-type: none"> <li>• Tape accessories</li> <li>• Procedure for measuring on level and sloping ground</li> <li>• Errors and mistakes in taping</li> </ul>	<i>LMS</i> <i>Module 3:</i> <i>Lesson</i> <i>2,3,4</i>  Chapter 3	8

	<ul style="list-style-type: none"> <li>• Taping calculations</li> <li>• Filed notes for taping</li> <li>• Classroom activity</li> <li>• Assignment 2</li> <li>• Field Exercise 6 – Building Measurement</li> </ul>		
1,2,3	<b>9. Introduction to Total Stations Theodolites</b>	Chapter 6	9
	<ul style="list-style-type: none"> <li>• General background</li> <li>• Reference directions for vertical angles</li> <li>• Meridians</li> <li>• Horizontal angles</li> <li>• Classroom activity</li> <li>• Field Exercise 7 – Set up of optical plumb Theodolite and angular measurement</li> </ul>		
1,2,3	<b>10. Angular Arithmetic and Traverse Surveying</b>	<i>LMS</i> <i>Module 4:</i> <i>Lesson 2,3</i>  Chapter 8	10-11
	<ul style="list-style-type: none"> <li>• Basic Trigonometric review</li> <li>• Azimuths</li> <li>• Bearings</li> <li>• Relationship between azimuths and bearings</li> <li>• Azimuth and bearing calculations for open and closed traverses</li> <li>• Laying off angles and distances</li> <li>• Classroom activity</li> <li>• Tutorial – azimuth and bearing calculations</li> <li>• Assignment 3</li> <li>• Field Exercise 8 – Traverse measurement</li> </ul>		
1,2,3	<b>11. Practical Applications using total Stations and Theodolites</b>	<i>LMS</i> <i>Module 4:</i> <i>Lesson 4</i>  Chapter 6	12
	<ul style="list-style-type: none"> <li>• Prolonging a straight line</li> <li>• Intersecting between two points</li> <li>• Intersecting a line</li> <li>• Prolonging a straight line past an obstacle</li> <li>• Field exercise 9 - Layout of simple object using a given reference line</li> <li>• Classroom activity</li> </ul>		
1,2,3	<b>12. Checking Instrument Calibration/Future of Surveying</b>	<i>LMS</i> <i>Module 3:</i> <i>Module 4:</i>  Chapters 3,6 & 8	13
	<ul style="list-style-type: none"> <li>• Peg test theory and procedure</li> <li>• Theory and procedure for checking the total station</li> <li>• Presentations on future trends for surveying</li> </ul>		

**13. Final Exam – Practical & Theory/Looking Forward**

14-15

- Review for final test
- Future Trends in Surveying
- Tie in to Spring Surveying Camp

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

- **LMS Study Guide**
- **Surveying with Construction Applications**  
Barry F. Kavanagh

**V. EVALUATION PROCESS/GRADING SYSTEM:**

You will be assigned a final grade based on successful completion of laboratories, assignments and tests, weighted as follows:

Paper Assignments (total of three assignments)	15%
Quizzes (total of five quizzes)	15%
Field assignments & Participation (total of eight activities)	20%
Two Practical Tests (equal weight)	10%
Mid Term Test	20%
Final Test	<u>20%</u>
<b>TOTAL</b>	<b>100%</b>

Please note that both paper and field assignments have to be handed in on the due date. Late submittals receive only a maximum grade of 60%. However, assignments handed in later that one week will receive a grade of 0%.

**The following semester grades will be assigned::**

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 - 100%	4.00
A	80 - 89%	4.00
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	

S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

Assignments and Examination Policy:

If a student is unable to write a test or exam at the scheduled time the following procedure shall apply:

- The student shall provide the professor with advance notice (in writing) of the need to miss the test
- The student shall provide documentation as to the reason for the absence and the make-up will be at the discretion of the professor.
- Upon return the student is responsible to make arrangements for the writing of the test. This arrangement shall be made prior to the next schedule class.
- In the event of an emergency, the student shall telephone the professor as soon as possible at 759-2554, to notify of the absence. If the professor is not available, the college has a 24 hour voice mail system.
- In the event of a test missed due to emergency, the student shall provide documentation from a professional such as doctor or lawyer.
- All late assignments (without documentation) will receive a maximum grade of C (60%).

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

**VI. SPECIAL NOTES:**Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers may not be granted admission to the room.

**VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.