

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE:** RIGGING, HOISTING AND MATERIAL HANDLING

**CODE NO. :** CCT101 **SEMESTER:**

**PROGRAM:** CONSTRUCTION CARPENTRY TECHNIQUES

**AUTHOR:** MIKE BUTCHER

**DATE:** SEPT 2010 **PREVIOUS OUTLINE DATED:** SEPT 2009

**APPROVED:**

	<hr/>	<b>CHAIR</b>	<hr/>	<b>DATE</b>
<b>TOTAL CREDITS:</b>	FOUR			

**PREREQUISITE(S):**

**HOURS/WEEK:**

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**I. COURSE DESCRIPTION:**

This course will provide the student with basic knowledge of modern, effective rigging, hoisting and material handling practices. The student will learn technical principles and concepts of load handling, as well as industry specific health & safety regulations that apply in the Province of Ontario.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. Describe and demonstrate the use of material handling tools, equipment and personal protective equipment according to the manufacturer and Occupational Health and Safety Standards.
2. Describe the methods and procedures required for material handling and equipment load and unload operations according to the manufacturer and Occupational Health and Safety Standards.
3. Describe the methods and procedures required for moving material around the job site according to the manufacturer and Occupational Health & Safety Standards.
4. Describe the basics of centre of gravity and load distribution as they apply to loading, moving & hoisting of all materials on the job site according to industry standards, regulations and Occupational Health & Safety Standards.

**III. TOPICS:**

1. Introduction to construction related PPE (Personal Protective Equipment) - proper use & application.
2. Examine The Ontario Occupational Health & Safety Act & Regulations for Construction Projects, and understand how they apply to workers on construction projects.
3.
  - a) Identify, describe & understand material handling equipment and it's safe use, according to manufacturers specifications & the Occupational Health & Safety Act. This will include equipment such as slings (synthetic & wire rope), cables, chains, shackles, load binders, lifting clamps and hoists.
  - b) Describe the selection and use of rigging & hoisting

- equipment for the work application.
- c) Describe load/unload procedure signals required for co-workers communication.
  - d) Illustrate the documentation related to a load/unload procedure (i.e. the lift plan).
  - e) Illustrate the preparation of a load for shipping to a new site.
4. Describe methods & procedures for moving material around the job site.
- a) Identify the rigging & hoisting equipment for movement of material, including slings, cables, chains, shackles load binders, lifting clamps & hoists.
  - b) Recommend rigging & hoisting equipment for movement of material.
  - c) Apply the use of knots.
  - d) Illustrate signaling methods to co-workers regarding movement of material.
5. Define & apply the principles of centre of gravity and load management and apply them when selecting the appropriate material handling equipment for moving materials on a job site.
6. Describe daily inspection practices for equipment used in the movement of materials.

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

1. **Rigging Fundamentals Trainee Guide** – Prentice Hall (Available in the Sault College Book Store)
2. **Ontario Occupational Health & Safety Act & Regulations for Construction Projects** (Available in the Sault College Book Store)
3. **Personal Protective Equipment (PPE)** will be required during classes to be conducted in a shop environment. PPE required to be:
  - a) CSA Certified Hard Hat
  - b) CSA Certified (Green Patch) work boots
  - c) CSA Certified Safety Glasses
  - d) Work gloves

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

Quizzes (6), Assignments & Tests (3)	45%
Practical Tests	40%
<u>Attendance</u>	<u>15%</u>
Total	100%

The following semester grades will be assigned to students:

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	
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.	

All late assignments (without documentation) will receive a maximum grade of C (60%).

## 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.

## VII. COURSE OUTLINE ADDENDUM:

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

## VIII. COURSE TOPIC AND CONTENT

Topic and Content	Reading	Week
<b>1. Math review</b>	Hand outs	1
1.1 Volume, Area and Perimeter		
<b>2. Math Review</b>	Handout	2
2.1 Conversions		
2.2 Pressure, Density		
2.3 Introduction to construction related PPE (Personal Protective Equipment), its proper use & application.		
2.4 Assignment #1- Math Review (Due Next Week)		
<b>3. Rigging Devices and Centre of Gravity</b>		
3.1 List of different rigging devices	Handout	3,4
3.2 Centre of Gravity, Tension and Compression	Page 187	
<b>4. Slings and the Angular Factor</b>		
4.1 Pythagorean Theorem	Handout	5,6
4.2 Triangles (3,4,5)		
4.3 Rigging Triangles		
4.4 Assignment #2		
#1 Calculate volume and weight of the object to be lifted,		
#2 Percent of the load slings X and Y,		
#3 Vertical load acting on sling X and Y,		

<b>Topic and Content</b>	<b>Reading</b>	<b>Week</b>
#4 Appropriate diameter of wire rope sling. 4.5 Activity #1- to lift an object in the welding using an electric crane		
<b>5. Rigging Calculations</b>		
5.1 Sling choices (page 158) 5.2 Safety Factors 5.3 Dd Ratios 5.4 Assignment #3- Dd Ratio	Page 158 Handout	7
<b>6. Rigging and Hoisting</b>		
6.1 Shackle sizing 6.2 Lifting beam 6.3 Crane capacity 6.4 Spreader beam 6.5 Ratchet hoists	Handout	8,9
<b>7. Rigging Hardware</b>		
7.1 Inspection of Rigging Hardware 7.2 Inspection of Slings 7.3 Plate Clamps 7.4 Hazards in Crane Operating Areas 7.5 Types of Ropes 7.6 Assignment #4-Inspection of Slings, Hardware and Rope	Handout	10,11
<b>8. Weight Estimating</b>	Handout	12
8.1 Estimating Charts (Weight of different structural steel shapes) 8.2 Assignment #5- Estimate the weight of a work bench in the welding shop.		
<b>9. Rope Knots</b>	Handout	13,14
9.1 Types of rope knots 9.2 Four basic rope knots 9.3 Activity #2- Tying the four basic rope knots		
<b>10. Hand Signals</b>	Hoisting Operation Cards	15
10.1 Types of hand signals used in hoisting and rigging. 10.2 Activity #3- Using proper hand signals to lift an object.		