



## COURSE OUTLINE: MAC302 - METALLURGY III

Prepared: Peter Corbett

Approved: Corey Meunier, Chair, Technology and Skilled Trades

<b>Course Code: Title</b>	MAC302: METALLURGY III
<b>Program Number: Name</b>	6347: GENERAL MACHINIST L3
<b>Department:</b>	MECHANICAL TECHNIQUES PS
<b>Semesters/Terms:</b>	20F, 21F, 22F
<b>Course Description:</b>	This course is designed to provide Level III General Machinist Apprentices the ability to describe ferrous heat-treating processes and the characteristics of non-metallic materials.
<b>Total Credits:</b>	1
<b>Hours/Week:</b>	1
<b>Total Hours:</b>	6
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Essential Employability Skills (EES) addressed in this course:</b>	EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.
<b>Course Evaluation:</b>	Passing Grade: 50%, D  A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	Other Course Evaluation Requirements: Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed.  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 W Student has withdrawn from the course without academic penalty.

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

**Books and Required Resources:**

Technology Of Machine Tools by Steve F. Krar, Arthur R. Gill, Peter Smid, Robert J. Gerritsen  
Publisher: McGraw - Hill Edition: 8  
ISBN: 9781260565782

**Course Outcomes and Learning Objectives:**

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Describe safe working procedures associated with heat-treating furnaces and hand held equipment.	<p>1.1 Describe heat-treating safety procedures and equipment including:</p> <ul style="list-style-type: none"><li>- protective clothing</li><li>- protective equipment and gear</li><li>- good housekeeping</li><li>- temperatures</li><li>- ventilation</li><li>- fire hazards</li><li>- storage and handling of equipment</li></ul> <p>Describe hand held heat-treating safety procedures including:</p> <ul style="list-style-type: none"><li>- protective clothing</li><li>- protective equipment and gear</li><li>- good housekeeping</li><li>- temperatures</li><li>- ventilation</li><li>- fire hazards</li><li>- storage and handling of equipment</li></ul>
Course Outcome 2	Learning Objectives for Course Outcome 2
2. Describe ferrous metal heat-treating processes. (4 hrs)	<p>2.1 Describe the process and advantages of nitriding alloy steels:</p> <ul style="list-style-type: none"><li>- heat-treating specifications</li><li>- nitriding process</li><li>- types of alloy steels</li><li>- toughness</li><li>- wear resistance</li><li>- machinability</li><li>- type of furnace</li><li>- depth of hardness</li><li>- quenching media and procedures</li><li>-</li></ul> <p>Describe the process and advantages of gas carburizing parts:</p> <ul style="list-style-type: none"><li>- types of gases</li><li>- hardness</li><li>- toughness</li><li>- strength</li><li>- type of furnace</li><li>- quenching media and procedures</li><li>- heat-treating specification</li><li>- machinability</li><li>- type of metal</li></ul> <p>Describe the process and advantages of liquid carburizing of steel:</p> <ul style="list-style-type: none"><li>- heat-treating specifications</li></ul>

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554

		<ul style="list-style-type: none"><li>- quenching media and procedures</li><li>- hardness</li><li>- toughness</li><li>- strength</li><li>- materials</li></ul> <p>Describe the process and advantages of induction hardening:</p> <ul style="list-style-type: none"><li>- heat-treating specifications</li><li>- type of metal</li><li>- depth of hardness</li><li>- frequency levels</li><li>- toughness</li><li>- strength</li><li>- quenching media and procedures</li></ul>
	<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>
	3. Describe the properties and characteristics of non-metallic materials. (2 hrs)	3.1 Describe the properties and characteristics of non-metallic materials: <ul style="list-style-type: none"><li>- composites</li><li>- fiberglass</li><li>- carbon fiber</li><li>- plastics</li><li>- ceramic</li><li>- chemical</li><li>- physical</li><li>- mechanical</li><li>- optical</li><li>- shapes</li><li>- sizes</li><li>- tolerances</li><li>- surface conditions</li><li>- SPE code classifications</li><li>- heating response</li><li>- machinability</li><li>- applications</li><li>- surface finish</li><li>- fumes</li></ul>

<b>Evaluation Process and Grading System:</b>	<b>Evaluation Type</b>	<b>Evaluation Weight</b>
	Final Test	50%
	Midterm Test	50%

<b>Date:</b>	September 3, 2020
<b>Addendum:</b>	Please refer to the course outline addendum on the Learning Management System for further information.

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



SAULT COLLEGE | 443 NORTHERN AVENUE | SAULT STE. MARIE, ON P6B 4J3, CANADA | 705-759-2554