



COURSE OUTLINE: MAC302 - METALLURGY III

Prepared: Peter Corbett

Approved: Corey Meunier, Chair, Technology and Skilled Trades

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 W Student has withdrawn from the course without academic penalty.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

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.



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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">- protective clothing- protective equipment and gear- good housekeeping- temperatures- ventilation- fire hazards- storage and handling of equipment <p>Describe hand held heat-treating safety procedures including:</p> <ul style="list-style-type: none">- protective clothing- protective equipment and gear- good housekeeping- temperatures- ventilation- fire hazards- storage and handling of equipment
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">- heat-treating specifications- nitriding process- types of alloy steels- toughness- wear resistance- machinability- type of furnace- depth of hardness- quenching media and procedures- <p>Describe the process and advantages of gas carburizing parts:</p> <ul style="list-style-type: none">- types of gases- hardness- toughness- strength- type of furnace- quenching media and procedures- heat-treating specification- machinability- type of metal <p>Describe the process and advantages of liquid carburizing of steel:</p> <ul style="list-style-type: none">- heat-treating specifications

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

Evaluation Process and Grading System:	Evaluation Type	Evaluation Weight
	Final Test	50%
	Midterm Test	50%

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

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