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:	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.
Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	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 W Student has withdrawn from the course without academic penalty.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.

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.	1.1 Describe heat-treating safety procedures and equipment including: - protective clothing - protective equipment and gear - good housekeeping - temperatures - ventilation - fire hazards - storage and handling of equipment Describe hand held heat-treating safety procedures including: - 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)	2.1 Describe the process and advantages of nitriding alloy steels: - heat-treating specifications - nitriding process - types of alloy steels - toughness - wear resistance - machinability - type of furnace - depth of hardness - quenching media and procedures - Describe the process and advantages of gas carburizing parts: - types of gases - hardness - toughness - strength - type of furnace - quenching media and procedures - heat-treating specification - machinability - type of metal Describe the process and advantages of liquid carburizing of steel: - heat-treating specifications

		- quenching media and procedures - hardness - toughness - strength - materials Describe the process and advantages of induction hardening: - 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: - 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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