COURSE OUTLINE: MAC103 - METALLURGY

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Course Code: Title	MAC103: METALLURGY
Program Number: Name	6345: GENERAL MACHINIST
Department:	MECHANICAL TECHNIQUES PS
Academic Year:	2024-2025
Course Description:	Describe characteristics of metals. Describe the manufacturing processes to produce steel and cast iron. Describe the physical and mechanical properties of steels and cast iron. Describe identification systems for steels and cast iron. Describe shapes and surface appearance of standard stock materials.
Total Credits:	1
Hours/Week:	5
Total Hours:	10
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 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. 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. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.
Course Evaluation:	Passing Grade: 70%, B

	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.
Books and Required Resources:	Technology of Machine Tools by Steve F. Krar, Arthur R. Gill, Peter Smid, Robert J. Gerritsen Publisher: McGraw Hill Edition: 9th ISBN: 9781266277474 Technology of Machine Tools Student Workbook by Steve F. Krar, Arthur R. Gill, Peter Smid Publisher: McGraw Hill Edition: 9th ISBN: 9781266321054

Course Outcomes and Learning Objectives:

Course Outcome 1	**Learning Objectives for Course Outcome 1**
1. Describe characteristics of metals. (2 hrs)	1.1 Describe categories and basic chemistry of ferrous metals: - Tensile strength - Size, shape, and surface condition - Applications, machinability - Smelting & shaping processes - Tolerances, manufacturer`s code classification, alloying elements - Malleability, ductility, hardness - Corrosion and wear resistance - Material colour recognition 1.2 Identify ferrous metals by type and application: - Plain carbon steel - Free machining steel, alloy steel, tool steel - Cast iron, grey, white, high alloy cast iron - Ductile, malleable
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Describe the manufacturing processes to	2.1 Describe the manufacturing processes to produce steel and cast iron

produce steel and cast iron. (3 hrs)	- Primary metalworking processes - Casting, centrifugal casting process - Hot & cold rolling, cold drawing
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3 Describe the physical and mechanical properties of steels and cast iron. (3 hrs)	3.1 Describe the physical and mechanical properties of steels and cast iron: - Strength - Elasticity - Ductility - Hardness - Brittleness - Toughness - Malleability - Machinability
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4 Describe identification systems for steels and cast iron. (2 hrs)	4.1 Describe identifications systems for steels and cast iron - UNS, AISI, SAE, ASTM, ISO, MIL, CSA 4.2 Describe methods of workpiece traceability - Colour coding, letter number stamps, tagging, bar codes
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5 Describe shapes and surface appearance of standard stock materials. (2 hrs)	5.1 Describe the surface appearance of roller and/or drawn stock materials 5.2 Describe common structural shapes of rolled steel stock materials: - Structural shapes - beams, channels, tubes, angles, tees - Bar stock, rounds, square, flat, hexagon - Plate, sheet, strip, gauge stock 5.3 Describe common shapes of drawn stock materials: - Round wire - Round, square, flat, hexagon - Tubing, hollow sections

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Tests	100%

Date: August 22, 2024

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.