छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर

CHHATRAPATI SHAHU JI MAHRAJ UNIVERSITY, KANPUR

(पूर्ववर्ती कानपुर विश्वविद्यालय कानपुर)
Formerly Kanpur University, Kanpur – 208024

A Documentary Support

For

Matric No. – 1.1.1

Programme Outcomes & Course Outcomes

Under the

Criteria - I

(Curriculum Design and Development)

Key Indicator - 1.1

In

Matric No. – 1.1.1

B. Tech. (Materials Science & Metallurgical Engineering)

Department of Materials Science and Metallurgical Engineering

Student Performance and Learning Outcomes: Materials Science and Metallurgical Engineering

Program outcomes, program specific outcomes and course outcomes
OFFERED PROGRAMMES

Department of Materials Science and Metallurgical Engineering offers one program that is affiliated to C.S.J.M. University, Kanpur and recognized by AICTE:

Bachelor of Technology Degree in Materials Science and Metallurgical Engineering.

Program outcome (POs):

PO1: Students are employed in R& D Sector, metallurgical Industries and academic Institutions.
PO2: Materials Engineer can predict and control material properties through an understanding of atomic, molecular, crystalline, and microscopic structures of engineering materials.
PO3: Develops an ability to apply knowledge of mathematics, science, and metallurgical and materials engineering
PO4: Develops an ability to design and conduct experiments, as well as to analyze and interpret data
PO5: Develops an ability to identify, formulate, and solve industry and metallurgical and materials engineering problems.
PO6: Develops an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety manufacturability, and sustainability
PO7: Develops an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
PO8: Develops an understanding of professional and ethical responsibility
PO9: Develops an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety manufacturability, and sustainability
PO10: Developsan ability to function on multidisciplinary teams

Program Specific Outcomes (PSOs)

PSO1: Students can opt career as Scientist/Metallurgist
PSO2: Providing a platform to the undergraduate students to interact with scientists andengineers of national and international repute by deputing them to industrial andR&D centers of excellence for carrying out their Project work

Course Outcome: Students are expected to know metallurgical processes of steel making and their manufacturing along with their enhance research ability of engineering materials		
Course code	Course name	Outcome
MSE-S201	Thermodynamics and Kinetics of Materials	- Understanding of thermodynamic laws, processes and their use on materials and metallurgical aspect. - Knowledge of mixture, solution, chemical and electrical deriving forces
MSE-S202	Nature and Properties of Materials	- Understanding about the crystal structure and the bonding concept and also the existing defects in the crystals - Understanding about the thermal, magnetic and electrical properties
MSE-S203	Phase Equilibria in Materials	Understanding of importance of Phase Diagrams in the field of materials science and engineering. Defines phase, equilibrium, component, degree of freedom and phase rule concepts. Applies above mentioned concepts to the field of Materials Science and Engineering.
MSE-S204	Mechanical Behaviour of Materials	- Understanding of stress, strain and their relationships, along with study of these for various materials. - Knowledge of Fracture, Fatigue and Creep
MSE-S205	Materials Characterization -I	- Understanding of identifying crystal structure and related properties by X-Ray diffraction , surface properties of materials by means of SEM and TEM
MSE-S206	Iron and Steel Making	- Describe the physical and chemical processes that take place during iron making and steelmaking - Analyses the effect of change in process parameters in iron making and steelmaking processes - Describe the methods for control of quality in

		iron and steel production
MSE-S301	Fundamentals of Materials Processing	- Understanding of solidification processing for metals and alloys and modification of their properties. - Knowledge of metal deformation, working, forming processes and thin films etc.
MSE – S302	Manufacturing Processes: Selection and Design	- To teach students to perform mathematical analyses of conventional and non-traditional manufacturing processes - To teach students to integrate core mechanical engineering principles to design manufacturingprocesses and systems
MSE-S303	Electronic and Optical Materials	- Understanding about the semiconductors and its applications. - Understanding about the optical properties of the materials
MSE-S304	Phase Transformation in Metals	- Characteristics of different phase transformation and how these characteristics can be controlled to design a desired microstructure.
MSE-S305	Heat Treatment of Metals	- The course describes the heat treatment operations, heat treatment equipment and heat treatment procedures.
MSE-S308	Diffusion in Solids	- Understanding of diffusion processes in solid metals with various solutions of diffusion equations. - Knowledge of diffusion phenomenon in semiconductors, grain boundaries, surface, etc .
MSE-S307	Principal of Powder Processing	• Differentiate manufacturing methods for the production of metal powders • Discuss particle morphology: size, shape, characterization • Understand the requirements of lubricants and binders -

MSE-310	Materials Characterization - II	- Understanding about the different characterization techniques to analyze the structural, thermal, surface and other properties to check the suitability of the materials for several applications
MSE 401	Composite materials	• Upon completion of this course the student will be able to: 1. Explain the mechanical behaviour of layered composites compared to isotropic materials. 2. Apply constitutive equations of composite materials and understand mechanical behaviour at micro and macro levels. 3. Determine stresses and strains relation in composites materials
MSE 402	Fuel Furnace and Refractory	- At the end of this course students should able to analyse different types of unit operations used in coal and mineral processing industries.And after completing this course students should able to analyze quality of fuels based on its properties and possible utilisation
MSE-S404	Electronic Materials for Industry	- Understand the quantum mechanics of electron in crystals. - Understand the basic electrical and magnetic properties of crystalline solids and amorphous materials. - Understand the difference between electronic structures and physical properties of semiconductors, metals, and dielectrics.
MSE-S405	Heat and Mass Transfer	- This course explains the basics of heat transfer by conduction, convection and radiation. The course provides the students basics of heat transfer by conduction in solids for solid state conditions, heat transfer by convection, heat transfer by thermal radiation and convective mass transfer..
MSE-S502	Transport phenomenon	- At the end of the course the students will learn Generalized equations for mass, momentum and heat. - Reynolds and Gauss theorems. - Combined diffusive and convective transport. - Film- and penetration models for mass and heat transfer. - Stefan-Maxwells equations for multi-component diffusion etc.

MSE-S505	Ceramic materials	-	The objective of the course is to provide to students advanced information about ceramic materials for structural, electrotechnical and mechanical applications from the view of relations between the structure of ceramic materials and their properties.