



1.1.3

List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	
Name of the Subjects/Related to all three Components (Employability/ Entrepreneurship/ Skill Development)	Yellow	



**List of Courses Focus on Employability/ Entrepreneurship/
Skill Development**

Department : Pure and applied physics

Programme Name : Master of Science in Physics

Academic Year : 2017-18

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	PT-304	Material Science –I
02.	PT-401	Experimental Technique in Physics
03.	PT-402	Accelerator Physics
04.	PT-404	Material Science –II

विभागाध्यक्ष/H.O.D.
शुद्ध एवं अनुप्रयुक्त भौतिकी विभाग
Dept. of Pure & Applied Physics
गुरु घासीदास विश्वविद्यालय
Guru Ghasidas Vishwavidyalaya
बिलासपुर (छ.ग.)/Bilaspur (C.G.)



Scheme and Syllabus

Semester-I	Semester-II
<p>PT-101-Mathematical Physics</p> <p>PT-102-Classical Mechanics</p> <p>PT-103-Quantum Mechanics-I</p> <p>PT-104-Basic Electronic Devices</p> <p>PT-105- Lab Course</p>	<p>PT-201-Atomic and Molecular Physics</p> <p>PT-202- Nuclear and Particle Physics</p> <p>PT-203- Solid State Physics</p> <p>PT-204- Quantum Mechanics-II</p> <p>PT-205- Lab Course</p>
Semester-III	Semester-IV
<p>PT-301- Statistical Mechanics</p> <p>PT-302-Introductory to Computational Physics</p> <p>PT-303- Electrodynamics</p> <p>PT-304-Specialization Material Science –I</p> <p>PT-305- Lab Course</p>	<p>PT-401-Experimental Technique in Physics</p> <p>PT-402- Accelerator Physics</p> <p>PT-403-Molecular Physics and Group Theory</p> <p>PT-404- Specialization Material Science –II</p> <p>PT-405- Project Work</p>



Special Paper : Material Science -I

Laws of thermodynamics, Thermodynamic functions, Concept of free energy, Stability and metastability, Relative stability of phases, Phase rule and phase diagrams, Solid solutions, Limited and unlimited solid solubility, interstitial and substitutional solid solutions, Hume Rothery rules, Uniary (single component) and Binary phase diagrams (Lead - tin and Iron-carbon phase diagram), Lever rule, Homogeneous and heterogeneous nucleation, growth and transformation kinetics, Micro-structural changes during cooling and heating.

Preparation of bulk, thin film and nano-materials: Solid state reactions method, sol-gel method, precipitation method. Nanomaterials: Bottom up method: Cluster beam evaporation, Ion beam deposition, Chemical bath deposition; Top down method: Ball Milling, Lithography. Advantages and disadvantages of various synthesis methods.

Polymers, mechanism of polymerization, Molecular weight distribution in linear polymers, condensation. polymers, size distribution in polymer molecules, Effect of polymer structure on properties conducting polymer, Introduction to liquid crystalline materials, Mechanism of liquid crystal display devices,

Introduction to Dielectric, magnetic and multiferroic materials: Dielectric materials, linear and non-linear dielectrics, Ferro-electric materials, Important characteristics and applications of ferro-electric materials, Para, ferro, anti-ferro magnetic properties of materials, hysteresis losses, hard and soft magnetic materials, Structure and properties of spinals, garnets and hexagonal ferrites, and their uses. magnetic bubbles.

Books Recommended :

1. Materials Science & Engineering : V. Raghavan
2. Elements of materials science & Engineering : L.H. Van
3. The Structure and properties of materials : R.M. Rose & J. Wulf

(Handwritten signatures and stamps)
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PT 401



PT-402 Accelerator Physics

UNIT-I

History of Accelerators, Brief descriptions of Accelerators centers worldwide, Accelerator Centers in India, Motion of charge particle in electric and magnetic field, Hamiltonian for particle motion Accelerator, Linear betatron motion, Particle motion dipole and quadrupole, Liouville's theorems, Emittance, Brightness DC Accelerators: Van-de-Graaff, Tandem and Pelletron Accelerator, DC accelerators in India, Bilaspur accelerator.

UNIT-II

Circular Accelerator: Synchrotron, Longitudinal equation of motion, evolution of synchrotron phase space ellipse, Injection & extraction, Circular accelerator: Simple cyclotron, Superconducting accelerators, Cyclotrons in India, colliders and storage

UNIT-III

Linear Accelerator: Fundamental properties of accelerator structure; transit time, shunt impedance, Particle Accelerator by EM waves, Longitudinal particle dynamics in LINAC, Transversal beam dynamics in LINAC, Druft tube Linac, Radio Frequency Quadrupole,

UNIT-IV

Production of charged particles, space charges limitation; n-tou product, Extraction & focusing geometries, positive ion sources; penning ionization source, ECR source, Electron beam ion source, negative ion sources; SNICS, TORVIS, duo-plasmatron.

Beam optics: Transfer matrix method, dipole, quadrupole, sextupole, octupole, Einzel lens, solenoid, beam analyzers, steerer, beam line components.

Applications: Solid State physics & materials science, Nuclear physics, high energy particle physics, industrial applications, medical applications

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गुरु घासीदास विश्वविद्यालय
(केंद्रीय विश्वविद्यालय अधिनियम 2009 डा. 25 के अंतर्गत स्थापित केंद्रीय विश्वविद्यालय)
कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur - 495009 (C.G.)