NED UNIVERSITY OF ENGINEERING & TECHNOLOGY
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No.Acad/27(195)/52776 **Dated: 26-06-2025**

NOTIFICATION

In pursuance to powers delegated to the Academic Council by Syndicate vide its Resolution No. SYN-186.4(b) dated 26-10-2018, it is hereby notified that the Academic Council vide its Resolution No. AC-168.7(i) dated 26-05-2025 has approved the revised Scheme of Studies & Courses along-with Course Dependency Chart for BS (Physics) Programme by the Department of Physics; applicable from Batch-2025.

One copy of the aforesaid approved revised Scheme of Studies is enclosed as **Annex: A**.

REGISTRAR

Encl: as above

To,
Chairperson, Department of Physics

Copy to:-

1- Dean (ASC)
2- Controller of Examinations
3- Director, I.T. Department
4- Assistant Registrar (Academic)

Copy for information to:-

1- PS to the Vice Chancellor
2- PA to Pro-Vice Chancellor
3- Director QEC

Scheme of Studies-Bachelor of Science (Physics) (BSPH) Batch 2025 and onwards **Annex: A**

FIRST-YEAR									
Fall Semester					**Spring Semester**				
		Credit Hours					**Credit Hours**		
Course Code	**Course Title**	**Th**	**Pr**	**Total**	**Course Code**	**Course Title**	**Th**	**Pr**	**Total**
EA-128	Functional English	**3**	**0**	**3**	ES-105/ ES-127	Pakistan Studies / Pakistan Studies (for Foreigners)	**2**	**0**	**2**
ES-206/ ES 209	Islamic Studies / Ethical Behaviour (for non-Muslims)	**2**	**0**	**2**	MT-102	Quantitative Reasoning-II	**3**	**0**	**3**
ES-108	Ideology and Constitution of Pakistan	**2**	**0**	**2**	MT-116	Calculus and Analytical Geometry	**3**	**0**	**3**
MT-101	Quantitative Reasoning-I	**3**	**0**	**3**	PH-133	Waves and Optics	**3**	**1**	**4**
PH-131	Introductory Mechanics	**3**	**1**	**4**	AF-101	IT Fundamentals and Applications	**2**	**1**	**3**
PH-132	Electricity and Magnetism	**2**	**1**	**3**					
MT-100	Introduction to Mathematics (For Pre-Medical students)	**-**	**-**	**NC**					
	Total	**15**	**2**	**17**		**Total**	**13**	**2**	**15**
SECOND YEAR									
Fall Semester					**Spring Semester**				
		Credit Hours					**Credit Hours**		
Course Code	**Course Title**	**Th**	**Pr**	**Total**	**Course Code**	**Course Title**	**Th**	**Pr**	**Total**
EA-244	Academic Reading and Writing	**3**	**0**	**3**	EL-238	Digital Electronics	**3**	**1**	**4**
EL-232	Electronics	**3**	**1**	**4**	MG-485	Entrepreneurship	**2**	**0**	**2**
CT-175	Programming Fundamentals	**3**	**1**	**4**	PH-205	Classical Mechanics	**3**	**0**	**3**
MT-221	Linear Algebra & Ordinary Differential Equations	**3**	**0**	**3**	PH-209	Modern Physics	**3**	**1**	**4**
PH-208	Heat and Thermodynamics	**2**	**1**	**3**	AF-201	Civics & Community Engagement	**2**	**0**	**2**
					PH-303	Mathematical Physics-I	**3**	**0**	**3**
					AF-200	Community Service	**-**	**-**	**NC**
	Total	**14**	**3**	**17**		**Total**	**16**	**2**	**18**
THIRD YEAR									
Fall Semester					**Spring Semester**				
		Credit Hours					**Credit Hours**		
Course Code	**Course Title**	**Th**	**Pr**	**Total**	**Course Code**	**Course Title**	**Th**	**Pr**	**Total**
CT-262	Introduction to Artificial Intelligence	**2**	**1**	**3**	MG-110	Fundamentals of Management	**3**	**0**	**3**
PH-301	Quantum Mechanics-I	**3**	**0**	**3**	PH-304	Electromagnetic Theory-I	**3**	**0**	**3**
PH-306	Statistical Mechanics	**3**	**0**	**3**	PH-316	Condensed Matter Physics	**3**	**0**	**3**
PH-307	Mathematical Physics-II	**3**	**0**	**3**	PH-317	Atomic and Molecular Physics	**2**	**1**	**3**
PH-314	Principles of Scientific Inquiry	**3**	**0**	**3**	PH-318	Introduction to Astronomy	**3**	**0**	**3**
PH-315	Nuclear Physics	**2**	**1**	**3**	PH-419	Fundamentals of Medical Physics	**3**	**0**	**3**
					EA/ES-###	Foreign Language-I	**-**	**-**	**NC**
	Total	**16**	**2**	**18**		**Total**	**17**	**1**	**18**
FOURTH-YEAR									
Fall Semester					**Spring Semester**				
		Credit Hours					**Credit Hours**		
Course Code	**Course Title**	**Th**	**Pr**	**Total**	**Course Code**	**Course Title**	**Th**	**Pr**	**Total**
PH-308	Quantum Mechanics-II	**3**	**0**	**3**	PH-429	Environmental Physics	**3**	**0**	**3**
PH-309	Electromagnetic Theory-II	**3**	**0**	**3**	PH-431	Computational Physics	**3**	**1**	**4**
PH-407	Physics Design Project	**0**	**3**	**3**	PH-407	Physics Design Project	**0**	**3**	**3**
PH-###	Elective-I	**3**	**0**	**3**	PH-###	Elective-III	**3**	**0**	**3**
PH-###	Elective-II	**3**	**0**	**3**	PH-###	Elective-IV	**3**	**0**	**3**
EA/ES-###	Foreign Language-II	**-**	**-**	**NC**					
	Total	**12**	**3**	**15**		**Total**	**12**	**4**	**16**
						Grand Total			**134**

ELECTIVE COURSES*									
		Credit Hours					Credit Hours		
Course Code	Course Title	Th	Pr	Total	Course Code	Course Title	Th	Pr	Total
PH-302	Laser Engineering	**3**	**0**	**3**	PH-424	Fundamentals of Health Physics	**3**	**0**	**3**
PH-310	Solid State Physics-I	**3**	**0**	**3**	PH-425	Microwaves Systems	**3**	**0**	**3**
PH-313	Cosmology and Theory of Relativity	**3**	**0**	**3**	PH-426	Fundamentals of Quantum Field Theory	**3**	**0**	**3**
PH-403	Solid State Physics-II	**3**	**0**	**3**	PH-427	Dielectric Materials	**3**	**0**	**3**
PH-411	Applications of Space Physics	**3**	**0**	**3**	PH-428	Renewable Energy Sources	**3**	**0**	**3**
PH-420	Nano Science and Nanotechnology	**3**	**0**	**3**	PH-430	Optoelectronic Devices	**3**	**0**	**3**
PH-421	Vacuum Science	**3**	**0**	**3**	PH-432	Materials Science	**3**	**0**	**3**
PH-422	Plasma Physics	**3**	**0**	**3**	PH-433	Fundamentals of Quantum Computing	**3**	**0**	**3**
PH-423	Surface Science and Applications	**3**	**0**	**3**					

***** *Offering is subject to the department's discretion.*

Foreign Language-I		Foreign Language-II	
Course Code	**Course Title**	**Course Code**	**Course Title**
EA-220	Chinese Language-I	EA-221	Chinese Language-II
EA-231	Turkish Language-I	EA-232	Turkish Language-II
EA-224	German Language-I	EA-225	German Language-II
EA-226	French Language-I	EA-227	French Language-II
ES-222	Arabic Language-I	ES-223	Arabic Language-II
EA-233	Japanese Language-I	EA-234	Japanese Language-II
EA-235	Russian Language-I	EA-236	Russian Language-II

List of New Courses- with course design forms

S.No	Course Code	Course Title	Th	Pr	Total
1.	PH-131	Introductory Mechanics	**3**	**1**	**4**
2.	PH-132	Electricity and Magnetism	**2**	**1**	**3**
3.	PH-133	Waves and Optics	**3**	**1**	**4**
4.	PH-208	Heat and Thermodynamics	**2**	**1**	**3**
5.	PH-209	Modern Physics	**3**	**1**	**4**
6.	PH-314	Principles of Scientific Inquiry	**3**	**0**	**3**
7.	PH-315	Nuclear Physics	**2**	**1**	**3**
8.	PH-316	Condensed Matter Physics	**3**	**0**	**3**
9.	PH-317	Atomic and Molecular Physics	**2**	**1**	**3**
10.	PH-318	Introduction to Astronomy	**3**	**0**	**3**
11.	PH-431	Computational Physics	**3**	**1**	**4**
12.	PH-432	Materials Science	**3**	**0**	**3**
13.	PH-433	Fundamentals of Quantum Computing	**3**	**0**	**3**
14.	AF-101	IT Fundamentals and Applications	**2**	**1**	**3**
15.	AF-201	Civics & Community Engagement	**2**	**0**	**2**
16.	AF-200	Community Service	**-**	**-**	**NC**

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-131 Introductory Mechanics

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***PH-131 Introductory Mechanics***				✓ **Compulsory Course** ☐ Elective Course Applicable from ***Batch 2025***
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Basic Concept: Review of vector algebra and vector calculus.
Motion in one and two dimensions: Motion in one- and two-dimensions, Motion under Constant Acceleration, Projectile Motion, Uniform Circular Motion Inertial and Non-Inertial Reference Frames.
Newton's Law: Newton's Laws of Motion and their applications, Time-dependent forces.
Newton's Law and Related Planetary Laws of Motion: Newton's Law of Gravitation, Kepler's Laws, Escape Velocity, and their applications.
Work and Energy: Work done by Constant and Variable Forces, Work-Energy theorem, Power, Conservative and Non-Conservative Forces.
System of Particles: Newton's Laws for a System of Particles, Conservation of Linear Momentum, Impulse, Momentum and Kinetic Energy in One- and Two-Dimensional Elastic and Inelastic Collisions.
Rotational Motion: Rotation about a Fixed Axis, Dynamics of rotatory bodies, Angular Motion, Parallel-axis Theorem, Torque and Newton's Law for Rotation, Angular Momentum for a System of Particles, Conservation of Angular Momentum, P recession of a Gyroscope, Static Equilibrium involving Forces and Torques, Determination of moment of inertia of various shapes, effects of Torque.
Elasticity and Fluid Mechanics: Elastic Properties of Matter, Poisson's ratio, the Relation between three types of elasticity, Fluid Statics, Variation of Pressure in fluid at rest and with height in the atmosphere, Coefficient of viscosity, fluid flow through a cylindrical pipe.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course

Text book(s)

1. David Halliday, Robert Resnick, Jearl Walker, *"Fundamentals of Physics, Extended"*, 12th Edition, Wiley, 2021.
2. R. A. Freedman, H. D. Young, and A. L. Ford (Sears and Zeemansky), *"University Physics with Modern Physics"*, 15th Edition, Pearson, 2019.

Reference Book(s)

1. RC Brown, *"Mechanics and Properties of Matter"*, Hassell Street Press, 2023.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-132 Electricity and Magnetism

EXISTING				APPROVED				✓ **New Course** □ Revised Course
Course Code and Title				***PH-132 Electricity & Magnetism***				✓ **Compulsory Course** □ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**2**	**2**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Electrostatic: Electric Charge, Conductors and Insulators, Coulomb's Law, Electric Fields due to a Point Charge, Electric Dipole Electric Flux, Gauss' Law and its Applications.
Electric Potential: Potential due to a Point Charge, Electric Dipole and continuous charge distributions. The Relation between Electric Field and Electric Potential Energy.
Capacitor and Capacitance: Parallel Plate, Capacitors in Series and Parallel, Energy Stored in Capacitors.
DC Circuits: Electric Current and Current Density, Resistance and Resistivity, Ohm's Law, Resistances in Series and Parallel, Circuit analysis rules and theorem**,** RC Circuits, Charging and Discharging of Capacitor.
Electromagnetic Induction: Inductance, Faraday's Law of Induction, Lenz's Law, Self- Inductance, RL Circuits.
Alternating Fields and Currents: Alternating Currents Circuit theory, Resonant circuits, Power in AC Circuits, Transformers, AC Bridges.
Magnetostatics: Magnetic force, Biot-savart law and its application, Ampere's circuital law and its application.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course

Text book(s)

1. David Halliday, Robert Resnick ,Jearl Walker , *"Fundamentals of Physics"*, 12th edition, Wiley, 2021
2. R. A. Freedman, H. D. Young, and A. L. Ford (Sears and Zeemansky), *"University Physics with Modern Physics"*, 15th Edition, Pearson, 2019.

Reference Book(s)

1. V. K. Sachan, *"Electricity and Magnetism"*, KDP Print, 2020.
2. P. F. Kelly, *"Electricity and Magnetism"*, 1st edition, CRC Press, 2021

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-133 Waves and Optics

EXISTING				APPROVED				
Course Code and Title				***PH-133 Waves and Optics***				✓ **New Course** □ Revised Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	✓ **Compulsory Course** □ Elective Course
Th.				**Th.**	**3**	**3**	**100**	Applicable from ***Batch 2025***
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Oscillations: Definition, equation of motion, energy considerations. Types of damping, equation of damped motion. Concept of driving force, amplitude response, and resonance phenomenon. Application of oscillation.

Waves: Types of waves, Transverse and longitudinal waves. General wave equation, traveling and standing waves. Definitions and physical significance of Phase and group velocity. Electromagnetic Waves. Doppler's effect explanation, formula derivation, and applications in sound and light.

Geometrical Optics: Wave fronts, laws of reflection and refraction. Lens formula, magnification, Newtonian equation for a thin lens. Simple magnifiers, microscopes, and telescopes. Chromatic and monochromatic aberrations, spherical aberrations.

Wave Optics: Two-beam and multiple-beam interference, Michelson interferometer. Fraunhofer diffraction, diffraction grating, resolving power**.** Brewster's law, dichroism, birefringence, John Matrices and production of polarized light**.** Application of optical phenomena, Coherence and holography.

Laser: Basic principles of laser light; properties of laser and physical background of production; laser resonators, mirrors and modes, and types of lasers.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course

Text book(s)

1. David Halliday, Robert Resnick ,Jearl Walker , *"Fundamentals of Physics"*, 12th edition, Wiley, 2021
2. A. P. French, *"Vibrations and Waves"*, CBS Publishers 2017

Reference Book(s)

1. A.G. Gurevich, G.A. Melkov, *"Magnetization Oscillations and Waves"*, 2020
2. C. A. Bennett, *"Principles of Physical Optics"*, John Wiley, 2022
3. Pedrotti, Frank L., Leno M. Pedrotti, and Leno S. Pedrotti, *"Introduction to optics"*, Cambridge University Press 2018.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-208 Heat and Thermodynamics

EXISTING				APPROVED				✓ **New Course** □ Revised Course
Course Code and Title				***PH-208 Heat and Thermodynamics***				✓ **Compulsory Course** □ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**2**	**2**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Basic Concepts and Definitions in Thermodynamics: Thermodynamic system, Surrounding and Boundaries, Macroscopic and microscopic description of system, Extensive and Intensive properties, Mechanical and Thermal Equilibrium, state, Path, Process, cycle, Zeroth Law of Thermodynamics, Consequence of Zeroth law of Thermodynamics.

Heat and Temperature: Temperature, temperature scales, Kinetic theory of ideal gas, Internal energy of an ideal gas, Equipartition of Energy, Intermolecular forces, ideal and real gases, The Van der Waals equation of state, compressibility factor.

Thermodynamics: First law of thermodynamics and its applications to adiabatic, isothermal, cyclic and free expansion. Reversible and irreversible processes, Second law of thermodynamics, Carnot theorem and Carnot engine. Heat engine, Refrigerators, Calculation of efficiency of heat engines, Entropy, Entropy in reversible process, Entropy in irreversible process. Entropy and Second law of thermodynamics, Entropy and Probability, Thermodynamic functions, Internal energy, Enthalpy, Gibb's functions, Entropy, Helmholtz functions, Maxwell's relations, TdS equations, Energy equations and their applications, Low Temperature Physics, Joule-Thomson effect and its equations. Thermoelectricity, Thermocouple, Seabeck's effect, Peltier's effect, Thomson effect.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course

Text book(s)

1. David Halliday, Robert Resnick ,Jearl Walker , *"Fundamentals of Physics"*, 12th edition, Wily, 2021
2. Henry Clyde Foust III, *"Thermodynamics, Gas Dynamics, and Combustion"*, 1st edition, Springer, 2022

Reference Book(s)

1. Pokrovskii, Vladimir, *"Thermodynamics of Complex Systems: Principles and applications*", IOP Publishing, 2020

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-209 Modern Physics

EXISTING				APPROVED				✓ **New Course** □ Revised Course
Course Code and Title				*PH-209 Modern Physics*				✓ **Compulsory Course** □ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Wave-Particle Duality: The consequences of black body radiation, Stefan Boltzmann, Wien's, and Planck's law, the quantization of energy, Photoelectric and Compton effect, Line spectra, quantum theory, de-Broglie hypothesis and its testing, Davisson Germier Experiment and J.P. Thomson Experiment, Wave behavior of particles and relation to the probability of particle, Wave packets, and particles, localizing a wave in space and time.

Atomic Physics: Bohr's theory, Frank-Hertz experiment, energy levels of electrons, atomic spectrum, Angular momentum of electrons, Vector atom model, orbital angular momentum, Spin quantization, Bohr's Magnetron, X-ray spectrum (continuous and discrete) Moseley's law, Pauli's exclusion principle, and its use in developing the periodic table.

Basic Concepts of Radioactivity: Laws of Radioactivity, Half-Life and Radioactive dating, types of decay.

Special Theory of Relativity: Einstein's Postulates of special relativity and their consequences, The Lorentz transformation, Transformation of relativistic momentum, and energy.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course

Text book(s)

1. R. A. Freedman, H. D. Young, and A. L. Ford, *"University Physics with Modern Physics"*, 15th edition, Pearson, 2019.
2. Kenneth S. Krane, "Modern Physics" 4th edition, Wiley, 2019.

Reference Book(s)

1. Gary N. Felder , Kenny M. Felder, *"Modern Physics"* ,Cambridge University Press, 2022

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-314 Principles of Scientific Inquiry

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***PH-314 Principles of Scientific Inquiry***				✓ **Compulsory Course** ☐ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**0**	**0**	**0**	**REMARKS**

Foundations of Scientific Inquiry*:* Introduction to Science and the Nature of Inquiry, History and Philosophy of Science.

The Scientific Method: Steps and Applications, Laws, Theories, and Hypotheses, The Role of Observation and Experimentation Logical Reasoning and Problem-Solving in Science, Understanding Uncertainty and Error in Science, Error Analysis

Experimental Design and Methodology*:* Types of Scientific Investigations (Observational, Experimental, Theoretical), Designing Controlled Experiments, Independent, Dependent, and Control Variables, Sampling Techniques and Representativeness, Measurement and Instrumentation Basics, Calibration and Standardization in Experiments, Reproducibility and Validity of Results, Common Experimental Pitfalls and Biases, Lab Safety and Ethical Considerations, Ethical use of Generative AI.

Data Collection and Management: Techniques for Data Collection (Manual, Automated, Digital Sensors), Recording Observations Accurately, Organizing and Managing Data Sets, Introduction to Spreadsheets and Data Tools

Data Analysis and Interpretation: Descriptive Statistics, Graphical Data Representation, Introduction to Statistical Inference, Understanding Confidence Intervals and p-values, Curve Fitting and Trend Analysis, Identifying Correlations and Causations, Handling Outliers and Anomalies, Dimensional Analysis and Unit Conversions, Basic Data Analysis, Drawing Conclusions from Data.

Communicating Scientific Ideas: The Structure of Scientific Explanations, Writing Clear and Logical Lab Reports, Creating Effective Visual Aids (Charts, Graphs, and Diagrams), Basics of Scientific Posters and Presentation Design, Explaining Complex Concepts to Non-Experts, The Role of Peer Feedback and Constructive Criticism.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course

Text book(s)

1. Leavy, P., *"Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, And Community-Based Participatory Research Approaches"*, 2nd edition. Guilford Press, London, 2022.
2. Alasuutari, P., & Qadir, A, *"Introduction to Research Methods: A Beginner's Guide To Quantitative, Qualitative, And Mixed Methods Research"*, Routledge London, 2023

Reference Book(s)

1. Merriam, S. B., & Tisdell, E. J. (2020). *"Qualitative research: A guide to design and implementation"*, 5th edition, John Wiley & Sons, 2020
2. Creswell, J. W., & Guetterman, T. C., *"Educational Research: Planning, Conducting, and Evaluating Quantitative And Qualitative Research"*, 6th edition. Pearson Publications, 2018

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

PH-315 Nuclear Physics

F/QSP 07/05/01

EXISTING				APPROVED				✓ **New Course** □ Revised Course
Course Code and Title				***PH-315 Nuclear Physics***				✓ **Compulsory Course** □ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**2**	**2**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Properties of the nucleus and nuclear forces: nuclear size, mass, and radius, Binding energy and semi-empirical mass formula, Magnetic dipole and electric quadrupole moments, Parity, statistics, and isobaric spin, nuclear spin and energy levels. Nuclear force nature and theory.

Nuclear Models: Liquid drop model and semi-empirical mass formula, Shell model: magic numbers, closed shells, and spin-orbit interaction, Collective model and nuclear deformations, Fermi gas model.

Radioactive Decay: Laws of radioactive disintegration, Quantum theory of radioactive decay, Alpha decay: quantum theory, angular momentum, parity selection rules, spectroscopy, Beta decay: Fermi theory, neutrino hypothesis, parity violation, double beta decay, Gamma decay: multi-polarity, angular momentum, selection rules, nuclear isomerism and internal conversion.

Nuclear Reactions: Conservation laws in nuclear reactions, Q-values and threshold energy, Cross-sections and energy levels, Direct and resonance reactions, Compound nucleus theory and its limitations, Breit-Wigner formula for nuclear reactions. Nuclear fission and fusion.

Radiation Detection and Measurement: Basic principle of detection, Ionization chamber, proportional counter, and Geiger-Muller counter, Scintillation counters and semiconductor detectors, Bubble chamber and cloud chamber.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Samuel S. M. Wong, *"Introductory Nuclear Physics"*, 2nd edition, Wiley-VCH, 2024.
2. Alexandre Obertelli and Hiroyuki Sagawa, *"Modern Nuclear Physics: From Fundamentals to Frontiers",* 1st edition, Springer, 2021

Reference Book(s)

1. K. Heyde, *"Basic Ideas and Concepts in Nuclear Physics: An Introductory Approach",* 3rd edition, CRC Press, 2020.
2. Isao Tanihata, Hiroshi Toki, Toshitaka Kajino, *"Handbook of Nuclear Physics"*, 1st edition, Springer; 2023.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-316 Condensed Matter Physics

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***PH-316 Condensed Matter Physics***				✓ **Compulsory Course** ☐ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**0**	**0**	**0**	**REMARKS**

Crystal Structure: Fundamental Types of Lattices, Simple crystal structures, Miller indices, Theoretical determination of density from crystal structure, Diffraction of x-rays by crystals, Fourier Analysis of the Basis, Reciprocal lattice vectors, Brillouin zone Interpretation, Determination of cubic structure by XRD.

Electrical Conductivity and Free Electron Fermi gas: Classical free electron theory (Drude Model) of metals, electrical conductivity and Ohm's Law, Matthiessen law, thermal conductivity of metals, Wiedemann-Franz law and Lorentz number, cyclotron frequency, Hall effect.

Lattice Vibrations and Thermal Properties: Vibration of lattice with monoatomic, Classical theory of Specific heat. Einstein and Debye models of specific heat.

Semiconductor Physics: General properties of semiconductors, intrinsic and extrinsic semiconductors, band structure and Fermi Dirac distribution, Carrier statistics in intrinsic and extrinsic semiconductors, variation of conductivity with temperature.

Dielectrics: Types of polarizations, Types of dielectric materials, Measurement of dielectric constant, Dielectric constant and polarizability, Local field and Maxwell field, Claussius-Mossotti equation, AC Polarizability.

Magnetism: Magnetic dipole moment and susceptibility, different types of magnetic materials, Langevin diamagnetic equation. Paramagnetic equation and Curie law, Ferromagnetism, Saturation magnetization, Ferromagnetic Domains and their origin.

Superconductivity: Superconductivity, critical temperature, Meissner effect, Type I and Type II superconductors, BCS theory of superconductivity.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Saurabh Basu, *"Condensed Matter Physics: A Modern Perspective"*, IoP Publishing Ltd, 2023.
2. Vimal Kumar Jain, *"Solid State Physics"*, 3rd edition, Springer Nature Switzerland AG, 2022.

Reference Book(s)

1. Sharon Ann Holgate, *"Understanding Solid State Physics",* 2nd edition, CRC Press, 2021.
2. M.A. Wahab, *"Solid State Physics: Structure and Properties of Materials"*, 3rd edition, Alpha Science, 2017.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-317 Atomic and Molecular Physics

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***PH-317 Atomic and Molecular Physics***				✓ **Compulsory Course** ☐ Elective Course Applicable from ***Batch 2025***
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.				**Th.**	**2**	**2**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

One-Electron Systems: Bohr model and Schrödinger equation for one-electron atoms, Reduced mass and atomic units, Energy levels, spectra, and spectroscopic notation, Quantum angular momentum and spherical harmonics, Electron spin and spin-orbit interaction, Lamb shift, hyperfine structure, and isotopic shifts.

Many-Electron Atoms: Schrödinger equation for multi-electron atoms, Pauli's exclusion principle and periodic table structure, coupling of angular momenta: LS coupling, jj coupling, Central field approximation

Interaction of atom with radiation: Electromagnetic field interactions with charged particles, Radiative transition rates and dipole approximation, Einstein coefficients and selection rules, Dipole-allowed and forbidden transitions, Metastable levels, line intensities, and lifetimes, Zeeman effect and Stark effect with types, Paschen-Back effect.

Molecular Structure and Bonding: Covalent and ionic bonding, Born-Oppenheimer approximation, Hydrogen molecular ion (LCAO approximation), Hydrogen molecule (Heitler-London and molecular orbital theories).

Molecular Spectra: Rotational, vibrational, and electronic spectra of diatomic molecules, Transition probabilities and selection rules, Franck-Condon principle and Hund's cases, Raman spectroscopy and Mossbauer spectroscopy.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Luciano Prof. Colombo, *"Atomic and Molecular Physics: A Primer"*, IOP Publishing Ltd, 2019

Reference Book(s)

1. C. J. Foot, *"Atomic Physics"*, Oxford University Press, 2005.
2. J. M. Hollas, *"Basic Atomic & Molecular Spectroscopy"*, John Wiley, 2002.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-318 Introduction to Astronomy

EXISTING				APPROVED				✓ **New Course** □ Revised Course
Course Code and Title				***PH-318 Introduction to Astronomy***				✓ **Compulsory Course** □ Elective Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	Applicable from ***Batch 2025***
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**0**	**0**	**0**	**REMARKS**

Introduction: Scientific notations, Special Units, Approximations, Units of distance in astrophysics.

The origin of Astronomy: Classical astronomy, Copernicus, Planetary motion, Gravitation, Gravitation near the Earth's Surface, Isaac Newton and Orbital Motion, Laws related to the motion of Planets and Satellites, Energy Consideration in Planetary and Satellite motion, Kepler's Law, Surface temperature and luminosity of Sun, Solar and Infrared flux,

Earth and the Sky: Latitude, Longitude, Equator, Hemisphere, Movements of Earth: Rotation (on its axis), Revolution (around the Sun), the resulting effects of some of these movements: day & night, seasons, atmospheric layers of Earth, leap year.

The Solar System: The survey of solar system, The Sun, life and death of Sun, Internal Structure and the Atmosphere of Sun, motion of the Sun, Solar Wind and Aurora.

Planets: Definition of Planet, Terrestrial Planets, Planetary Properties, Dwarf Planets, special case of Pluto, Asteroids, Meteors, Comets.

Moon: Lunar Phases, motion of the Moon, Solar & Lunar Eclipses.

Beyond the Sun: Stars and Types of Stars, Life Cycle of Stars: Formation, Evolution and Death of Stars, Nebulas and their types, Constellations. Celestial Sphere,

Galaxies: Types of Galaxies; Milky Way Galaxy, Nearby Galaxies. Supermassive Black Holes and Active Galaxies.

This course is designed to address the natural sciences requirement of HEC NCRC 2025.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Kwok, S. *"Our Place in The Universe: Understanding Fundamental Astronomy from Ancient Discoveries"*, 2nd edition, Springer 2017.

Reference Book(s)

1. Morison I. *"Introduction to Astronomy and Cosmology*", Wiley 2008.
2. Seeds, M. A., & Backman, D. E. *"Astronomy: The Solar System and Beyond*", 6th edition, Brooks / Cole Cengage Learning, (2010).

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-431 Computational Physics

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***PH-431 Computational Physics***				✓ **Compulsory Course** ☐ Elective Course Applicable from ***Batch 2025***
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**1**	**3**	**50**	**REMARKS**

Computer languages: A brief Introduction to computer languages and known software packages of computation.
Errors: Error analysis and technique for elimination of systematic and random errors, determination of relative true error and relative approximate error in numerical methods.
Numerical Methods: Bracketing and open methods to find root of equation, solution of linear algebraic equations, regression and interpolation, Newton's divided difference and Lagrange interpolation technique, the trapezoidal and Simpson's rules for numerical integration, differentiation, numerical methods for solutions of ordinary differential equation (ODE).
Modeling & Simulations: Conceptual models, the mathematical models, Random numbers and random walk, doing Physics with random numbers, Computer simulation, Relationship of modeling and simulation.
Modeling of Physical Systems: Motion of falling objects, projectile motion, oscillatory motion, planetary motion, many particle systems, dynamic systems, wave phenomena, Field of static charges and current, Diffusion, Populations genetics.

This course is designed according to the guidelines of HEC NCRC 2025.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Sujaul Chowdhury, *"Computational Physics"*, American Academic Press, 2021.
2. Omair Zubairi, Fridolin Weber, *"Introduction to Computational Physics for Undergraduates"*, IoP, 2018.

Reference Book(s)

1. S. C. Chapra and R. P. Chanle, *"Numerical Methods for Engineers with Personal Computer Applications"*, McGraw Hill,1990.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-432 Materials Science

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course ☐ Compulsory Course ✓ **Elective Course** Applicable from ***Batch 2025***
Course Code and Title				***PH-432 Materials Science***				
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.				**Th.**	**3**	**3**	**100**	
Pr.				**Pr**	**0**	**0**	**0**	**REMARKS**

Structures and bonding: Atomic and Subatomic Structures, Micro, Macro and Nano structures, Crystalline and Amorphous, Structures of Common Metallic Materials, Crystallographic Planes and Directions, Primary, Secondary and Mixed bonding.
Defects in solids: Point Imperfections, Vacancies, Interstitial Defect, Line Imperfection, Edge Defect and Surface Imperfections.
Classification of materials: Metals, Types of Metal Alloys, Ceramics, Classification and Applications of Ceramics, Properties of Ceramics, Polymers Polymer Basics, Polymer Identification, Polymer molecules, Additional Polymerization, Step Growth Polymerization, Measurement of Molecular weight, Thermosetting polymers and Gels, Rubbers and Rubber Elasticity, Introduction to Biomaterials, Materials Selection, Biopolymers, Hard Materials, Biomedical Materials.
Mechanical properties: Elastic deformation macroscopic approach, Elastic deformation microscopic approach, the elastic limit, Dislocations, shear strength of single crystals, slips, stress fields of dislocation, Low angle grain boundaries, Dislocation densities, Dislocation multiplication and slip, Strength of alloys, Dislocations and crystal growth, Hardness of materials. Thermal Expansion, Estimate of the Yield stress, , Fracture Mechanics, Ductile fracture, Brittle fracture, Griffith Criterion, Ductile fracture, Creep, Fatigue.
Electrical and Magnetic Properties: Conductivity and mobility, Electronic and ionic conduction, Electron-Phonon Interaction in Metals, Influence of Temperature on Magnetic behavior, Magnetic Anisotropy.
Optical Properties: Light interaction with solids, Optical properties of Metals and Non -Metals, Luminescence, Photoconductivity.
Material characterization Techniques: Scanning electron microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, X- ray Diffraction, Energy Dispersive X-Ray Spectroscopy.

This course is designed to enhance elective options in line with HEC NCRC guidelines.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Shackelford, J. F., *"Introduction to materials science for engineers"*, 9th edition, Pearson education limited, 2022.
2. Callister Jr, W. D., & Rethwisch, D. G. *"Materials science and engineering: an introduction"*, 10th edition John wiley & sons, 2020.

Reference Book(s)

1. Charles Kittle. *"Introduction to Solid State Physics",* 8th edition, Wiley and Sons, 2018
2. Ortega, E. O., Hosseinian, H., Meza, I. B. A., López, M. J. R., Vera, A. R., & Hosseini, S., *"Material characterization techniques and applications"*, 1st edition, Singapore: Springer, 2022.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

PH-433 Fundamentals of Quantum Computing

EXISTING				APPROVED				
Course Code and Title				***PH-433 Fundamentals of Quantum Computing***				✓ **New Course** ☐ Revised Course
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	☐ Compulsory Course ✓ **Elective Course**
Th.				**Th.**	**3**	**3**	**100**	Applicable from ***Batch 2025***
Pr.				**Pr**	**0**	**0**	**0**	**REMARKS**

Introduction to Quantum Mechanics, Review of linear algebra: vector spaces, inner products, and operators. Postulates of quantum mechanics. Qubits and quantum states: superposition and normalization.

Quantum Gates and Circuits: Single-qubit gates: Pauli matrices, Hadamard, and phase gates. Multi-qubit systems: tensor products and entanglement. Controlled operations: CNOT gate and general controlled gates. Quantum circuit representation and design.

Quantum Algorithms: Deutsch-Jozsa algorithm, Quantum Fourier Transform (QFT), Shor's algorithm for integer factorization, Grover's search algorithm.

Quantum Errors and Correction: Quantum noise and decoherence, The Shor and Steane codes.

Physical Implementations of Quantum Computers: Superconducting qubits, trapped ions, Photonic Qubits, spin qubits and Diamond Qubits.

Quantum Cryptography: Uncertainty principle, Polarization and Spin basis, BB84, BB90, and Ekert protocols, Quantum cryptography with and without eavesdropping.

This course is designed to enhance elective options in line with HEC NCRC guidelines.

Recommended book(s) for the proposed course
(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Bernhardt, Chris, *"Quantum Computing for Everyone"*, MIT Press, 2023.
2. Mermin, N. David, *"Quantum Computer Science: An Introduction"*, Cambridge University Press, 2023.

Reference Book(s)

1. Jordan, Andrew N., and Irfan A. Siddiqi., *"Quantum Measurement: Theory and Practice"*, Cambridge University Press, 2024.
2. Kaiser, Sarah, and Christopher Granade, *"Learn Quantum Computing with Python and Q#"*, Manning Publications, 2021.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

F/QSP 07/05/01

AF-101 IT Fundamentals and Applications

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***AF-101 IT Fundamentals and Applications***				✓ **Compulsory Course** ☐ Elective Course Applicable from ***Batch 2025***
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.				**Th.**	**2**	**2**	**100**	
Pr.				**Pr**	**1**	**2**	**50**	**REMARKS**

Fundamentals of IT: Introduction to Information and Communication Technologies (ICT), Components and scope of ICT, ICT productivity tools, Emerging technologies and future trends, Ethical Considerations in Use of ICT Platforms and Tools, Applications of ICT in education, healthcare and finance. Digital citizenship.

Data Representation and Number Systems: Binary, octal, decimal, hexadecimal systems, data representation: characters, numbers, multimedia.

Databases: Fundamentals of databases: organization and storage, introduction to Information Systems (IS) and Management Information Systems (MIS), real world IS and MIS applications.

Data Communication and Computer Networking: Network topologies, types of network.

Programming Languages: Evolution and structures: syntax, semantics, special purpose vs. general-purpose languages, comparative study of data types, control structures and algorithms, basics of coding, practical problem solving.

Recommended book(s) for the proposed course

(Author's name, "*Title",* edition, publisher, publication year).

Text book(s)

1. Emily Jones, *"Fundamentals of Computer Programming"*, States Academic Press, 2022.
2. Prasun Barua, *"Fundamentals of Information and Communication Technology (ICT)"*, Independently published, 2023.

Reference Book(s)

1. Dr. Shun-Ping Chen, *"Fundamentals of Information and Communication Technologies"*, 1st Edition, Cambridge Scholars Publishing, 2020.
2. Muhammad Misbahudeen, *"The Fundamentals of Programming: Basic Terms and Concepts in Programming for Beginners"*, 2024.

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

COURSE DESIGN FORM

AF-201 Civics & Community Engagement

F/QSP 07/05/01

EXISTING				APPROVED				✓ **New Course** ☐ Revised Course
Course Code and Title				***AF-201 Civics & Community Engagement***				✓ **Compulsory Course** ☐ Elective Course Applicable from ***Batch 2025***
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.				**Th.**	**2**	**2**	**100**	
Pr.				**Pr**	**0**	**0**	**-**	**REMARKS**
N/A				**Introduction to Civics and Citizenship:** Definition of civics, citizenship and civic engagement, Historical evolution of civics participation, Types of citizenship: active, participatory, digital etc. The relationships between democracy and citizenship **Civics and Citizenship:** Concepts of civics, citizenship and civic engagement, Foundation of modern society and citizenship. Types of citizenship: active, participatory, digital etc. **State, Government and Civil Society:** Structure and functions of government in Pakistan, The relationships between democracy and civil society, Right to vote and importance of political participation and representation **Rights and Responsibilities:** Overview of fundamental rights and liberties of citizens under constitution of Pakistan 1973,Civic responsibilities and duties, Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.) **Community Engagement:** Concept, nature and characteristics of community, Community development and social cohesion, Approaches to effective community Engagement, case studies of successful community driven initiatives **Advocacy and Activism:** Public discourse and public opinion, role of advocacy in addressing social issues, Social action movements **Digital Citizenship and Technology:** The use of digital platforms for civic engagement, Cyber ethics and responsible use of social media, Digital divides and disparities (access, usage, socioeconomic, geographic etc.) and their impact on citizenship **Diversity, Inclusion and Social Justice:** Understanding diversity in society (ethnic, cultural, economic, political etc.), Youth, women and minorities' engagement in social development, Addressing social inequalities and injustice in Pakistan, Promoting inclusive citizenship and equal rights for societal harmony and peaceful co-existence				*A new course as per HEC revised undergraduate framework*

Recommended book(s) for the proposed course

1. Civics Today: Citizenship, Economics & You by McGraw-Hill Education
2. Citizenship in the Diverse Societies by Will Kymlicka and Wayne Norman
3. Engaging Youth in Civics Life by James Youniss and Peter Levine
4. Digital Citizenship in action: Empowering students to engage in online communities by Kristen Mattson
5. Globalization and Citizenship: In the pursuit of a Cosmopolitan Education by Graham Pike and David Selby
6. Community Engagement: Principles, Strategies, and Practices by Becky J. Feldpausch and Susan M. Omilian
7. Creating Social Change: A Blueprint of a Better World by Matthew Clarke and Marie-Monique Steckel

Other Equivalent Courses
(offered in this University)
None

NED University of Engineering and Technology

F/QSP 07/05/01

COURSE DESIGN FORM

AF-200 Community Service

EXISTING				APPROVED				
EA-200 Community Service				*AF-200 Community Service*				☐ New Course ✓ **Revised Course** ✓ **Compulsory Course** ☐ Elective Course Applicable from ***Batch 2025***
	Cr. Hrs.	**Contact Hrs.**	**Exam Marks**		**Cr. Hrs.**	**Contact Hrs.**	**Exam Marks**	
Th.	**0**	**1***	**--**	**Th.**	**0**	**1***	**--**	
Pr.	**0**	**2***	**--**	**Pr**	**0**	**2***	**--**	**REMARKS**

Orientation to CSC: [Taught component] Introduction to the concept and practice of community service. Need, objectives and benefits of community service. Foundational theories (educational, undergraduate curriculum, humanities, social science, corporate social responsibility etc.). Tools and skills needed in community service. Contextual examples in community service; case examples. Professional and ethical conduct during community service **Community Service Attachment** Completing 30-35 hours of formal assignment at an organization **Community Service Experience Documentation** Writing a report documenting the experience and submitting it on the prescribed format. NOTE: Total contact hour for theory (thought component 8 + documentation activity 6) will be 14 hours.	**Orientation to Community Service: [Taught component]** Introduction to the concept and practice of community service. Need, objectives and benefits of community service. Foundational theories (educational, undergraduate curriculum, humanities, social science, corporate social responsibility etc.). Tools and skills needed in community service. Contextual examples in community service; case examples. Professional and ethical conduct during community service **Community Service Attachment** Completing 30-35 hours of formal assignment at an organization **Community Service Experience Documentation** Writing a report documenting the experience and submitting it on the prescribed format. NOTE: Total contact hour for theory (thought component 8 + documentation activity 6) will be 14 hours.	

Reference book(s) for the proposed course

NOTE: The following resource books and many core journals dealing with community service theory and practice will be used for providing inputs during the taught component of the course:

1. Soria, K. M., & Mitchell, T. D. (Eds.). (2016). Civic Engagement and Community Service at Research Universities: Engaging Undergraduates for Social Justice, Social Change and Responsible Citizenship. Springer.
2. Butin, D. (2005). Service-learning in higher education: Critical issues and directions. Springer.
3. Crews, R. J. (2002). Higher education service-learning sourcebook. Greenwood Publishing Group.
4. Butin, D. (2012). Service-learning in theory and practice: The future of community engagement in higher education. Springer.
5. Lewis, B. A. (2009). The kid's guide to service projects: Over 500 service ideas for young people who want to make a difference. Free Spirit Publishing.

Other Equivalent Courses
(offered in this University)

1. Community Service (EA-200)
2. Community Service (CF-200)
3. Community Service (EF-200)
4. Community Service (MF-205)
5. Community Service (PF-205)

Course Dependency Chart of Approved Scheme of Studies for Batch 2025