Faculty of Science

Program: B.Sc.(NM)

Programme Outcomes (POs):

On successful completion of the Programme, students will have the ability to:

PO 1. Disciplinary Knowledge:

Demonstrate the comprehensive knowledge of both theoretical and experimental science in various fields of interest like Physics, Chemistry, Botany, Zoology and Math's.

PO 2. Critical Thinking and Problem Solving:

Develop critical thinking for identifying, analyzing and solving different kinds of theoretical / experimental problems by following scientific approach to knowledge development.

PO 3. Analytical / Scientific Reasoning:

Apply appropriate techniques and procedural knowledge to innovate and address complicated problems with evidence-based well-defined elucidations and explore the scientific reasoning for the obtained results.

PO 4. Research Related Skills:

Plan and learn various techniques and computational software's used for analysis and exploring research projects while keeping in mind the rules and regulations pertaining to different scientific research project operations.

PO 5. Effective Communication:

Demonstrate the subject knowledge through technical writings as well as oral presentations among the scientific community and society.

PO 6. Social Interaction and Effective Citizenship:

Bridge the gap between science and society by sharing their thoughts and findings at various technical/social platforms such as Symposia/Workshops/Science fairs and give their voluntary participation as their contribution towards development of the society.

PO 7. Multicultural Competency and Leadership Readiness:

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Work effectively either independently or as a team leader while being adaptable to various multicultural competency and understands the importance and strengths of interacting with and working alongside people from diverse backgrounds.

PO 8. Ethics:

Develop ethical awareness, work ethics and ethical issues in scientific research as well as plagiarism policies by exercising empathy and a caring attitude while maintaining professional integrity, honesty and high ethical standards.

PO 9. Environment and Sustainability:

Follow and practice scientific processes leading to safe and sustainable environment to achieve sustainable goals to transform society.

PO 10. Self-directed and Life-long Learning:

Inculcate a habit of self-learning continuously through various online/offline educational platforms and Ability to retain and build on critical thinking skills, and use them to update scientific knowledge and apply them in day to day business.

Course Name: Atomic Structure, Chemical Bonding, Chemical Energetics and Equilibria **Course Code: 17030103**

Course Outcomes:

CO1: Introduce the insights of atomic structures with reference to quantum mechanics.
CO2: To learn the concepts of chemical bonding with the help the different theories.
CO3: Introduce students to energetics of chemical reactions through Laws of Thermodynamics
CO4: Learn various concepts of chemical and ionic equilibria

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	-	1	1	1	2	2
CO2	3	3	3	2	-	1	1	1	2	2
CO3	3	3	3	2	-	1	-	-	1	3
CO4	3	3	3	1	-	1	-	-	1	2
Average	3	3	3	1.75	-	1	1	1	1.5	2.25

1 Weakly **2 Moderately** **3 Strongly**

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Course Name: Calculus **Course Code: 17030105**

Course Outcomes:

CO1: To understand limits, continuity and differentiability of functions in two variables and their properties.

CO2: To expand the two variables functions in series, form and discuss the maxima & Minima using expansion of functions.

CO3: To understand the concept of asymptotes and curve tracing of the functions and their properties.

CO4: To evaluate the double & triple integral and apply the multiple integrals to find the area and volume.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	3	1	-	-	-	-	-	2
CO2	3	2	3	1	1	-	-	-	-	2
CO3	3	2	3	1	1	-	-	-	-	2
CO4	3	2	3	1	-	-	-	-	-	2
Average	3	1.75	3	1	0.5	-	-	-	-	2

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Analysis-I **Course Code: 17030305**

Course Outcomes:

CO1: To understand the concept of limit points, open sets, closed sets, interior of a set, closure of a set in Real numbers.

CO2: To know the basics of sequences and series and discuss the convergence using various tests of convergence.

CO3: To evaluate analyticity, differentiability and continuity of complex valued function and discuss the applicability of complex function in flow equation.

CO4: To understand the concept of exponential function, logarithmic function, trigonometric function and apply the methods of complex analysis to evaluate definite integrals.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	-	-	1
CO2	3	3	2	1	1	-	-	1	-	1
CO3	2	2	3	3	1	-	1	-	1	-
CO4	3	2	2	2	1	-	1	-	1	-
Average	2.75	2.25	2.25	1.75	0.75	0.25	0.5	0.25	0.5	0.5

1 Weakly **2 Moderately** **3 Strongly**

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Course Name: Probability & Statistics **Course Code: 17030523**

Course Outcomes:

CO1: To enable to the basic concept of theory of probability.
CO2: To acquire knowledge of Sheppard's correction and Skewness and Kurtosis.
CO3: To know about Expectation and generating function.
CO4: To understand the concept of Binomial, Poisson and Normal distributions.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	1	1	2	-	-	-	2
CO2	3	3	3	2	1	1	-	-	-	1
CO3	3	2	2	1	1	1	-	-	-	2
CO4	2	3	3	3	1	1	-	1	1	2
Average	2.75	2.75	2.75	1.75	1	1.25	-	0.25	0.25	1.75

1 Weakly 2 Moderately 3 Strongly

Course Name: Analytical Methods in Chemistry **Course Code: 17030525**

Course Outcomes:

CO 1: Identify choice of source, monochromator and detector for single and double beam instrument in spectrometry.
CO 2: Use Flame photometers for the quantitative estimation of trace level of metal ions from water
CO 3: Calculate Enantiomeric excess (ee)/ diastereomeric excess (de) ratios and determination of enantiomeric composition using NMR, Chiral solvents and chiral shift reagents.
CO 4: Understand the basic principle of chromatography

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	-	1	2	2	2
CO2	3	2	2	2	1	-	1	1	2	2
CO3	3	3	2	2	1	-	1	1	2	2
CO4	3	2	2	1	2	-	-	1	1	2
Average	3	2.5	2.25	2.0	1.5	-	0.75	1.25	1.75	2.0

1 Weakly 2 Moderately 3 Strongly

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Course Name: SF& IT **Course Code: 17030547**

Course Outcomes:

CO1: To understand about theory of Laplace transform and their application to solve differential equations

CO2: To discuss the Fourier transform and its properties and to solve partial differential equations using Fourier transform.

CO3: To find series solution of differential equations with variable coefficient.

CO4: To understand the concept of series solution and discuss the solution of Legendre's equation and Bessel's equation

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	-	-	-	-	-	3
CO2	3	2	3	3	-	-	-	-	-	3
CO3	3	2	3	2	-	-	-	-	-	3
CO4	3	3	3	2	-	-	-	-	-	3
Average	3	3	3	2.5	-	-	-	-	-	3

1 Weakly **2 Moderately** **3 Strongly**

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Faculty of Science

Department of Chemistry

Program Specific Outcomes (M.Sc.- Chemistry)

On successful completion of the Program, students will have the ability to:

1. Disciplinary Knowledge: Demonstrate the comprehensive knowledge of both theoretical and experimental chemistry in various fields of interest like Physical Chemistry, Inorganic Chemistry and Organic Chemistry.

2. Critical Thinking and Problem Solving: Develop critical thinking for identifying, analyzing and solving different kinds of theoretical / experimental problems by following scientific approach to knowledge development.

3. Analytical / Scientific Reasoning: Apply appropriate techniques for the qualitative and quantitative analysis of chemical compounds and explores the scientific reasoning for the obtained results.

4. Research Related Skills: Plan and write basic chemistry research projects while keeping in mind the rules and regulations pertaining to different scientific research project operations.

5. Effective Communication: Demonstrate the subject knowledge through technical writings as well as oral presentations among the scientific community and society.

6. Social Interaction and Effective Citizenship: Present the experimental investigations at various technical platforms such as Conferences /Seminars/ Symposia/Workshops and also contribute to the future development of the nation through their voluntary participation in civic life.

7. Multicultural Competency and Leadership Readiness: Work effectively either independently or as a team leader while being adaptable to various multicultural professional environments.

8. Ethics: Develop ethical awareness, exercise empathy and a caring attitude while maintaining professional integrity, honesty and high ethical standards.

9. Environment and Sustainability: Follow and practice processes leading to safe environment and sustainable development while carrying out activities in the laboratory.

10. Self-directed and Life-long Learning: Inculcate a habit of self-learning continuously through various online/offline educational platforms for personal academic growth as well as for increasing employment opportunity.

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1st Semester

Course Name: Transition Metal Chemistry

Course Code: 17060101

Course Outcomes:

CO 1. Demonstrate the knowledge of different methods of synthesis of coordination complexes.

CO 2. Identify the various colours associated with the particular complexes.

CO 3. Apply the analytical reasoning for comparing the properties of these complexes by reparing similar complexes changing the metal.

CO 4. Perform the synthesis of inorganic compounds which leads to a safe laboratory environment.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	1	-	-	-	2	1
CO2	3	3	3	3	2	1	-	-	2	1
CO3	3	3	3	2	-	-	-	-	2	2
CO4	3	2	2	3	2	1	-	-	2	2
Average	3	2.5	2.5	2.75	1.6	1	-	-	2	1.5

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Course Name: Quantum Mechanics and Thermodynamics

Course Code: 17060102

Course Outcomes:

CO 1: Understand the various concepts of quantum mechanics & wave mechanics

CO 2: Explain the degeneracy in 3-D box, simple harmonic oscillator and rigid rotator

CO 3: Solve the problems related to first & second law of thermodynamics

CO 4: Describe systems of one component as well as multi-component systems.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	2	-	-	-	1	3	1
CO2	3	3	2	2	-	-	-	1	3	1
CO3	3	3	3	2	1	1	-	-	2	2
CO4	3	3	3	2	1	1	-	-	2	2
Average	3	3	2.5	2	1	1	-	1	2.5	1.5

Course Name: Stereo Chemistry and Organic Reaction Mechanism

Course Code: 17060103

Course Outcomes:

CO 1. Identify the stereocenters in a molecule and assign the configuration as R or S

CO 2. Know the relationship between enantiomers and their specific rotations.

CO 3. Develop capacity to solve the organic reaction mechanisms related problems.

CO 4. Know about the regio and chemoselectivity, and different types of elimination reactions.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	1	-	1	2
CO2	3	3	3	3	3	2	1	-	1	2
CO3	3	3	3	3	3	2	1	-	1	3
CO4	3	3	3	3	3	2	1	-	2	3
Average	3	3	3	3	3	2	1	-	1.25	2.5

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Course Name: Professional Ethics and Human Values

Course Code: 17060107

Course Outcomes:

CO 1. Understand the values of ethics and moral values deeply.

CO 2. Understand the value of environment and respect for nature.

CO 3. Realize the values of responsible citizens to work for the society.

CO 4. Take strong decisions and perform their duties responsibly as a professional.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	3	-	2	2	3	3
CO2	3	1	2	2	3	1	1	3	3	3
CO3	1	1	2	1	3	2	3	2	3	3
CO4	1	2	2	1	3	2	3	3	3	3
Average	2	1.5	2	1.25	3	1.67	2.25	2.5	3	3

Course Name: Analytical Chemistry

Course Code: 17060108

Course Outcomes:

CO1: To introduce students to instruments used in chemistry.

CO2: To explain all the polarographic and chromatographic techniques used and their working.

CO3 To introduce instrumentation and working of IR and Raman techniques

CO4: To provide the knowledge for quantitative and qualitative estimation of inorganic and organic compounds

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	3	3	1	2	-	3	-	2
CO2	1	3	3	3	1	1	-	2	-	1
CO3	1	3	3	3	1	1	-	1	-	2
CO4	1	3	3	3	1	1	-	3	-	3
Average	1	3	3	3	1	1.25	-	2.5	-	2

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Faculty of Science

Department of Chemistry

Program Specific Outcomes (M.Sc.- Chemistry)

On successful completion of the Program, students will have the ability to:

1. Disciplinary Knowledge: Demonstrate the comprehensive knowledge of both theoretical and experimental chemistry in various fields of interest like Physical Chemistry, Inorganic Chemistry and Organic Chemistry.

2. Critical Thinking and Problem Solving: Develop critical thinking for identifying, analyzing and solving different kinds of theoretical / experimental problems by following scientific approach to knowledge development.

3. Analytical / Scientific Reasoning: Apply appropriate techniques for the qualitative and quantitative analysis of chemical compounds and explores the scientific reasoning for the obtained results.

4. Research Related Skills: Plan and write basic chemistry research projects while keeping in mind the rules and regulations pertaining to different scientific research project operations.

5. Effective Communication: Demonstrate the subject knowledge through technical writings as well as oral presentations among the scientific community and society.

6. Social Interaction and Effective Citizenship: Present the experimental investigations at various technical platforms such as Conferences /Seminars/ Symposia/Workshops and also contribute to the future development of the nation through their voluntary participation in civic life.

7. Multicultural Competency and Leadership Readiness: Work effectively either independently or as a team leader while being adaptable to various multicultural professional environments.

8. Ethics: Develop ethical awareness, exercise empathy and a caring attitude while maintaining professional integrity, honesty and high ethical standards.

9. Environment and Sustainability: Follow and practice processes leading to safe environment and sustainable development while carrying out activities in the laboratory.

10. Self-directed and Life-long Learning: Inculcate a habit of self-learning continuously through various online/offline educational platforms for personal academic growth as well as for increasing employment opportunity.

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3rd Semester

Course Name: Advanced Inorganic Spectroscopy

Course Code: 17060301

Course Outcomes:

CO 1. Demonstrate the knowledge of group theory.

CO 2. Express the knowledge of the principle and application of electron spin resonance spectroscopy, Mossbauer spectroscopy, NMR.

CO 3. Apply the analytical reasoning for explaining the application of Mossbauer spectroscopy, ESR in structure determination of inorganic compounds.

CO 4. Explain the application of nuclear magnetic resonance spectroscopy for study of inorganic compounds.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	1	-	-	-	1	2
CO2	3	2	2	3	-	-	-	-	2	2
CO3	3	3	3	3	1	-	-	-	1	2
CO4	3	2	2	3	1	-	-	-	2	3
Average	3	2.25	2.25	3	1	-	-	-	1.5	2.25

Course Name: Coordination Chemistry

Course Code: 17060302

Course Outcomes:

CO 1: To demonstrate the knowledge of coordination chemistry.

CO 2: To explain the bonding in transition metal complexes.

CO 3: To apply the analytical reasoning for explaining spectroscopic states from spectroscopic terms and for Interpreting the Orgel and Tanabe-Sugano diagrams.

CO 4: To demonstrate the fundamentals of magnetochemistry in structure determination.

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Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	2	2	1	2	-	-	2
CO2	3	3	2	2	2	1	1	-	-	2
CO3	3	3	3	1	2	1	1	-	-	2
CO4	3	3	2	2	2	1	2	-	-	2
Average	3	3	2.25	1.75	2	1	1.5	-	-	2

Course Name: Organometallic Chemistry

Course Code: 17060303

Course Outcomes:

CO 1. Demonstrate the knowledge of organometallic chemistry.

CO 2. Identify and solve the problems related to organometallic compound structure, synthesis and reaction mechanism.

CO 3. Apply the analytical reasoning for explaining the properties of organometallic compounds for different applications like polymerization, catalytic hydrogenation etc.

CO 4. Explain the kinetics and stability of organometallic compounds.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	-	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	2	2	-	3	2	3	2	3	3	-
CO4	3	1	3	-	3	2	1	2	3	3
Average										

Course Name: Photochemistry and Pericyclic Reactions

Course Code: 17060313

Course Outcomes:

CO 1: Explain the phenomenon of photochemistry.

CO 2: Perform the photochemical reactions of alkenes, carbonyl and aromatic compounds.

CO 3: Apply the Woodward–Hoffmann rules governing pericyclic reactions

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CO 4: Describe different types of rearrangement reactions.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	3	3	3	3	2	-	2	-	1
CO2	1	3	3	3	3	2	-	3	-	2
CO3	1	3	3	3	1	3	-	2	-	3
CO4	1	3	3	3	2	2	-	2	-	2
Average	1	3	3	3	2.5	2.5	-	2.5	-	2

Course Name: Heterocyclic Chemistry and Organic Synthesis

Course Code: 17060314

Course Outcomes:

CO 1: Design the heterocyclic organic compounds

CO 2: Design and synthesize fused ring heterocyclic compounds

CO 3: Apply different name reactions in the synthesis of natural products

CO 4: Apply the strategies of disconnection approach

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	1	-	2	2
CO2	3	3	3	3	2	1	1	-	2	2
CO3	3	3	3	3	2	1	2	-	2	2
CO4	3	3	3	3	2	1	2	-	2	2
Average	**3**	**3**	**3**	**3**	**2**	**1**	**1.5**	**-**	**2**	**2**

Course Name: Rearrangements and Reagents

Course Code: 17060315

Course Outcomes:

CO 1. To apply the use of organometallic reagents in organic synthesis

CO 2. Apply different reagents in the organic transformations.

CO 3. Understand the need to study molecular rearrangements.

CO 4. Construct efficient, simple mechanistic pathways for the synthesis of a given compound

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Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	3	3	3	1	3	3
CO2	3	2	1	3	2	2	2	1	3	3
CO3	3	3	2	3	3	3	1	1	2	3
Average	3	2.6	1.6	3	2.8	2.6	2	1	2.6	3

Course Name: Drug Design & Development

Course Code: 17060319

Course Outcomes:

CO 1: Develop an understanding of drug targets as a recognition site for pharmaceutical agents; how the chemical structure of a substance influences interaction with a drug target

CO 2: Identify new drug targets for future drug discovery.

CO 3: Understand the key concepts of drug design.

CO 4: Apply knowledge to QSAR and molecular properties in designing of new drugs.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	1	-	1	1	1	-
CO2	3	2	2	-	1	-	1	1	2	-
CO3	2	3	-	2	-	-	1	1	1	1
CO4	2	2	2	1	2	-	-	1	1	1
Average	2.5	2.25	1.5	1.25	1.0	-	0.75	1.0	1.25	0.5

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Cos, POs mapping

Course Name: Environmental Legislations and Policies

Course Code: 17090107

Course Outcomes:

CO1: Understand role of Labels on different instruments.

CO2: Know about the insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance.

CO3: Understand duties of individuals for protection of environment.

CO4: Understand protocols and treaties for solution of different environmental problems.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	2	1	2	2	1	-	2
CO2	3	3	3	1	2	2	2	3	3	3
CO3	3	3	3	1	3	2	2	3	3	3
CO4	3	2	3	3	2	2	3	3	2	3
Average	3	2.75	2.75	2.5	2.5	2.75	3	3	2.75	3

1 Weakly **2 Moderately** **3 Strongly**

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Cos, POs mapping

Course Name: Environmental Impact Assessment and Risk Analysis

Course Code: 17090307

Course Outcomes:

CO1: Use their knowledge to identify the projects which required EIA.

CO2: Avoid serious and irreversible damage to the environment from developmental projects.

CO3: Identify key impacts and measures for mitigating adverse impacts of developmental projects on environment.

CO4: Understand various methods used for risk assessment.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	3	3	3	3	3
CO2	3	3	3	2	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	2	3	3	3	2	3
Average	3	2.75	2.75	2.5	2.5	2.75	3	3	2.75	3

1 Weakly **2 Moderately** **3 Strongly**

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Faculty of Science
Department of Environmental Science
Program: M. Sc Environmental Science

Program Outcomes (POs):

At completion of the program the student will be able to:

PO 1. Disciplinary knowledge:

Understand environmental contemporary problems, legislations and standards at social and corporate level.

PO 2. Critical thinking and scientific reasoning:

Critically investigate and evaluate complex issues, concepts and theories related to environmental concerns and conceptualize the reasons behind them.

PO 3. Problem Solving:

Apply principles of environmental science, to provide scientifically sound and socially acceptable solutions for day-to-day environmental problems.

PO 4. Research related skills:

Plan, conduct and manage basic research projects, based on environmental issues while using their scientific skills in sample collection, analysis and data interpretation.

PO 5. Social interaction and effective citizenship:

Bridge the gap between science and society in achieving ecosystem restoration, conservation and management including well-being of the society and nation.

PO 6. Effective communication:

Able to communicate scientific findings and final outcomes in oral and written form to specialist and non-specialist audiences.

PO 7. Multicultural competency and leadership readiness:

Work effectively either independently or in a group or as team leader in different multicultural habitats for wellbeing of the nature

PO 8. Environmental sustainability:

Apply his / her the knowledge to conserve natural resources and minimize environmental degradation to achieve environmental sustainability.

PO 9. Ethics:

Participate and contribute ethically in different roles at society level as an environmentally responsible citizen.

PO 10. Self-directed and lifelong learning:

Learn and engage themselves in various community services designed to aware the society about current environmental problems and future preservation.

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Course Name: Environment Modelling and Simulation
Course Code: 17090301
Course Outcomes: (Students will be able to)

CO-1 To understand various computer-based and statistical methods used for study and management of natural resources and the environment.
CO-2 To understand about remote-sensing techniques, physical principles, sampling, statistics and image-analysis methods.
CO-3 To understand different environmental aspects and methodology of formulation of dynamic balance models.
CO-4 To explain the working principle and applications of GIS and GPS.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	-	-	2
CO2	3	3	2	1	-	-	-	1	-	2
CO3	3	3	2	3	-	1	-	-	-	2
CO4	3	3	3	2	-	-	1	1	-	2
Average	3	2.75	2.25	1.75	-	1	1	1	-	3

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Soil Chemistry and Solid Waste Management
Course Code: 17090302
Course Outcomes: (Students will be able to)

CO-1 To understand the implications of the production, resource management and environmental impact of solid waste management.
CO-2 To understand components of solid waste management infrastructure systems to minimize the above effects.
CO-3 To be familiar with relationships between inappropriate waste management practices and their impacts on water, soil and sediment quality.
CO-4 To understand the solid waste and its environmental implications and to learn about safe methods of solid waste disposal.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	1	1	1	1	1	2
CO2	3	3	2	2	1	1	1	2	1	2
CO3	3	3	2	3	2	2	1	2	2	3
CO4	3	2	2	2	1	1	2	2	1	3
Average	3	2.5	2	2.25	1.25	1.25	1.25	1.75	1.25	2.5

1 Weakly **2 Moderately** **3 Strongly**

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Course Name: Fundamentals of meteorology and climatology
Course Code: 17090303
Course Outcomes: (Students will be able to)

CO1: To understand the weather pattern at different sites.
CO2: To understand and explain the processes of climate.
CO3: To be familiar with various environmental factors affecting weather conditions
CO4: To predict the weather phenomenon/events based on the analysis of existing conditions.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	-	-	1	-	-	1
CO2	3	3	2	-	--	2	-	2	-	2
CO3	3	2	3	-	-	-	-	-	-	-
CO4	3	2	3	3	-	-	-	1	-	3
Average	3	2.25	2.5	1.25	-	0.5	0.25	0.75	-	1.5

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Environmental Impact Assessment and Risk Analysis
Course Code: 17090307
Course Outcomes: (Students will be able to)
CO1: Use their knowledge to identify the projects which required EIA.
CO2: Avoid serious and irreversible damage to the environment from developmental projects.
CO3: Identify key impacts and measures for mitigating adverse impacts of developmental projects on environment.
CO4: Understand various methods used for risk assessment.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	3	3	3	3	3
CO2	3	3	3	2	3	2	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	2	3	3	3	2	3
Average	3	2.75	2.75	2.5	2.5	2.75	3	3	2.75	3

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Ecology **Course Code:** 17090101
Course Outcomes:

CO1: To understand principles of ecology, and predict potentially adverse effect which might happens around them.
CO2: To understand the relationship of living organisms with their environment.

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CO3: To understand about population and resource dynamics in relation with nature, forests, wild species and climatic factors.

CO4: To understand population growth and characteristics.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	1	3	2	3
CO2	3	2	3	3	3	1	-	2	2	3
CO3	3	3	2	2	3	2	3	-	3	2
CO4	3	2	3	3	3	3	1	2	1	1
Average	3	2.5	2.75	2.75	3	2.25	1.67	2.34	2	2.25

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Water Chemistry and Pollution
Course Code: 17090102
Course Outcomes: (Student will be able to)

CO-1 To understand the basic concepts of thermodynamics.

CO-2 To understand water distribution, water quality and different physico-chemical properties of water.

CO-3 To know about different water quality parameters and their permissible limits.

CO-4 To understand the dynamics of water treatment in both sewage and effluent treatment processes and their practical operation.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	2	2	1	1	-	1	-	2
CO2	3	3	2	2	1	1	-	2	-	2
CO3	3	2	2	3	2	2	-	2	2	3
CO4	3	2	2	2	1	1	-	2	1	3
Average	2.75	2.5	2	2.5	1.25	1.25	-	1.75	0.75	2.5

1 Weakly **2 Moderately** **3 Strongly**

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Course Name: Instrumentation & Analysis
Course Code: 17090103
Course Outcomes:

CO1 To understand different environmental monitoring and analysis techniques to choose according to the field study requirement.

CO2 To get acquainted with different spectroscopy based techniques and other analytical methods.

CO3 To understand methods for quantification of different bio molecules.

CO4: To use various instruments and analytical methods for analysis.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	1	-	1	-	-	-	2
CO2	3	3	2	1	-	-	-	1	-	2
CO3	3	3	2	2	-	1	-	-	-	2
CO4	3	3	2	2	-	-	1	1	-	2
Average	3	3	2	1.5	-	1	1	1	-	2

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Environmental Legislations and Policies
Course Code: 17090107
Course Outcomes:

CO1: Understand role of Labels on different instruments.

CO2: Know about the insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance.

CO3: Understand duties of individuals for protection of environment.

CO4: Understand protocols and treaties for solution of different environmental problems.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	1	2	1	2	2	1	-	2
CO2	3	3	3	1	2	2	2	3	3	3
CO3	3	3	3	1	3	2	2	3	3	3
CO4	3	2	3	3	2	2	3	3	2	3
Average	3	2.75	2.75	2.5	2.5	2.75	3	3	2.75	3

1 Weakly **2 Moderately** **3 Strongly**

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Course Name: Professional Ethics and Human values

Course Code: 17090108

Course Outcomes:

CO1: The students will understand the values of ethics and moral values deeply.

CO2: The students will understand the value of environment and respect for nature.

CO3: The students will realize the values of responsible citizens to work for the society.

CO4: The students will be able to take strong decisions and perform their duties responsibly as a professional.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	3	-	2	2	3	3
CO2	3	1	2	2	3	1	1	3	3	3
CO3	1	1	2	1	3	2	3	2	3	3
CO4	1	2	2	1	3	2	3	3	3	3
Average	2	1.5	2	1.25	3	1.67	2.25	2.5	3	3

1 Weakly **2 Moderately** **3 Strongly**

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CO-PO MAPPING
B.Sc. (H) Forensic Science- 1st Semester

Program Outcomes (POs):

On successful completion of the Program, students will be able to

PO 1. Disciplinary Knowledge

Investigate and explain the real time forensic issues in legal and social context.

PO 2. Critical Thinking and Problem Solving

Precisely hypothesize and reconstruct the events surrounding a crime scene based on their critical thinking and observation skills.

PO 3. Analytical / Scientific Reasoning

Analyze and describe theoretical, conceptual and experimental data and interpret the final results.

PO 4. Research Related Skills

Collate and interpret scientific information for writing review articles, short communications, case reports etc.

PO 5. Effective Communication:

Communicate effectively their thoughts, opinions and findings related to professional conduct and social issues in the form of technical writing and oral presentations.

PO 6. Social Interaction and Effective Citizenship:

Interact wisely and smartly within the society with a focus on achieving their target without spoiling the societal harmony.

PO 7. Multicultural Competency and Leadership Readiness:

Foster self-confidence, self-awareness, leadership and collaborative skills to work in a multicultural and multidisciplinary environment.

PO 8. Ethics

Practice moral values and professional ethics while keeping up with their expertise and genuineness.

PO 9. Environment and Sustainability

Practice and follow the processes required for a sustainable, healthy and safe environment and will be abreast with the contextual knowledge of current environmental issues.

PO 10. Self-directed and Life-long Learning:

Acquire a habit of continuous self-learning through various online/offline learning platforms for personal academic/professional growth.

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Course Name: Introduction to Forensic Science
Course Code: 17040101

Course Outcomes:

CO1:Understand about the basic principles and history of Forensic science in India and worldwide.
CO2: Understand the concept of expert witness and report writing with Indian justice system.
CO3: Understand about the organizational set up of forensic science laboratories.
CO4: Understand and again scientific aptitude regarding the working and functioning of mobile forensic units.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	1	1	-	1	-	-	2
CO2	3	3	2	1	1	-	-	-	-	1
CO3	3	1	1	2	1	1	2	-	1	-
CO4	3	1	1	2	1	1	2	-	1	-
Average	3	1.75	1.25	1.5	1	0.5	1.25	-	0.5	0.75

Course Name: Crime Scene Investigation
Course Code: 17040103

Course Outcomes:

CO1: Understand the methods of securing, searching and documenting the crime scenes.
CO2: Develop scientific aptitude of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.
CO3: Develop ethical and scientific skills to maintain chain of custody
CO4: Gain analytical skills to use the tools and techniques for analysis of different types of crime scene evidence.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	3	2	3	1	1	-	3	2	2
CO2	3	3	3	3	1	2	-	3	3	1
CO3	2	2	2	1	2	1	1	2	-	1
CO4	3	3	2	3	1	2	1	1	2	2
Average	2.5	2.75	2.25	2.5	1.25	1.5	1	2.25	2.3	1.5

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Course Name: Technological Methods in Forensic Science
Course Code: 17040105

Course Outcomes:

CO1: Understand the importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
CO2: Gain analytical skills to utilize colorimetry, electrophoresis and neutron activation techniques in identifying chemical and biological materials.
CO3: Develop scientific aptitude to understand the significance of microscopy in visualizing trace evidence and comparing it with control samples.
CO4: Understand and develop moral values while performing photography and videography for recording the crime scenes.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	1	-	-	-
CO2	3	3	3	3	1	1	-	-	-	-
CO3	3	3	3	3	1	1	-	-	-	-
CO4	3	3	3	3	1	1	-	-	-	-
Average	3	3	3	3	1.25	1	-	-	-	-

Course Name: Forensic Accounting
Course Code: 17040301

Course Outcomes:

CO1: Apply forensic principles in solving financial crimes.
CO2: Classify and understand various acts and laws pertaining to fraud and its examination
CO3: Reproduce the crucial steps involved in fraud investigation.
CO4: Analyze the reports of internal and external audits and reconstruct the timeline associated with fraud.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	2	2	2	1	-	1
CO2	3	2	2	2	1	2	2	-	-	1
CO3	3	-	-	1	3	2	3	2	-	2
CO4	3	2	1	1	2	1	2	1	-	3
Average	3	1.75	1.5	1.5	2	1.75	2.25	1	-	1.75

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Course Name: Crime Scene Ethics and Evidence Management

Course Code: 17040303

Course Outcomes:

CO1: To know about the disciplinary knowledge of the crime scene management.
CO2: To develop critical thinking and problem-solving strategies by management of real life forensic investigations.
CO3: To develop analytical and scientific reasoning for crime scene investigation
CO4: To practice moral values and professional ethics while keeping up with their expertise and genuineness at the crime scene and during court testimony.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	3	2	3	2	3	3	2
CO2	2	1	2	2	1	2	2	2	2	3
CO3	3	2	3	1	3	1	3	3	2	1
CO4	2	3	2	2	3	3	2	3	3	2
Average	2.5	2	2.5	2	2.25	2.25	2.25	2.75	2.5	2

Course Name: Accidental Investigation

Course Code: 17040305

Course Outcomes:

CO1: To know about the practical knowledge of the crime scene management.
CO2: To develop critical thinking and problem solving strategies during crime scene investigation.
CO3: To develop analytical and scientific reasoning for crime scene investigation.
CO4: To develop practical approach for collection and preservation of the physical evidence.

Course outcomes and Program outcomes Mapping -

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	2	3	2	1
CO2	3	3	3	3	3	1	1	3	1	1
CO3	3	3	3	3	2	2	1	3	1	2
CO4	3	3	3	3	2	1	2	3	1	1
Average	3	3	3	3	2.5	1.5	1.5	3	1.25	1.25

Course Name: Forensic Ballistics

Course Code: 17040501

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Course Outcomes:

CO1: Classify the firearms on the basis of characteristic features and their firing mechanisms.
CO2: Identify, examine and compare the bullet and cartridge cases for control and crime samples.
CO3: Understand the nature of firearm injuries and their medico-legal aspects
CO4: Estimate the range of firing.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	1	2	2	-	3
CO2	3	3	3	2	-	-	1	2	-	3
CO3	3	3	3	2	-	-	1	3	-	3
CO4	3	3	3	2	1	1	1	2	-	3
Average	3	3	3	2	1	1	1.25	2.25	-	3

Course Name: Forensic Toxicology
Course Code: 17040503

Course Outcomes:

CO1: The significance of toxicological studies in forensic science
CO2: Different types of poisons and toxins in criminal cases of toxicological interest.
CO3: The absorption of poisons in body fluids.
CO4: The classification and characteristics of the narcotics, drugs and psychotropic substances

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	-	-	-	-	-	-	2
CO2	2	3	2	-	-	1	-	-	1	2
CO3	3	3	3	2	-	1	-	-	1	2
CO4	3	1	1	1	1	1	-	-	1	3
Average	2.75	2.25	2.25	.75	.25	.75	-	-	.75	2.25

Course Name: Forensic Serology
Course Code: 17040505

Course Outcomes:

CO1: The significance of Forensic Serology in crime investigation.
CO2: The importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations.
CO3: The usefulness of genetic markers in forensic investigations.
CO4: The forensic importance of bloodstain patterns

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	-	1	-	-	-	2
CO2	3	3	3	1	1	-	-	-	-	2
CO3	3	3	3	1	-	-	-	-	-	2

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CO4	3	3	3	1	-	1	-	-	-	2
Average	3	3	3	1.25	0.25	2	-	-	-	2

Course Name: Economic Offences
Course Code: 17040507

Course Outcomes:
CO1: Various economical offences in the society and their detection parameters.
CO2: The economic crimes pertaining to national security.
CO3: Economic crimes linkage to other criminal acts.
CO4: The need and scope of forensic science in detection of economic offences.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	3	3	3	3	1	1
CO2	3	3	3	2	3	2	1	3	1	2
CO3	3	3	3	3	2	2	1	3	1	1
CO4	3	3	3	3	2	2	2	3	1	1

Course Name: Accidental Investigation
Course Code: 17040509

Course Outcomes:
CO1: Document and investigate the accident cases forensically.
CO2: Understand the significance of Motor Vehicle evidences in accidents
CO3: Analyse the accident like pre-crash, post-crash movements of vehicle
CO4: Study of Tachographs, their data, and to prepare case reports for court presentation.

Course outcomes and Program outcomes Mapping -

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	2	3	2	1
CO2	3	3	3	3	3	1	1	3	1	1
CO3	3	3	3	3	2	2	1	3	1	2
CO4	3	3	3	3	2	1	2	3	1	1
Average	3	3	3	3	2.5	1.5	1.5	3	1.25	1.25

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CO-PO MAPPING
M.Sc. Forensic Science- 1st Semester

Program Outcomes (POs)

On successful completion of the Program, students will be able to

PO 1. Disciplinary Knowledge

Investigate and explain the real time forensic issues in legal and social context along with the in depth understanding of criminal justice system.

PO 2. Critical Thinking and Problem Solving
Precisely hypothesize and reconstruct the events surrounding a crime scene based on their critical thinking and observation skills.

PO 3. Analytical / Scientific Reasoning
Analyse and describe theoretical, conceptual and experimental data and interpret the final results.

PO 4. Research Related Skills
Generate, record, collate and interpret scientific data for conducting research and writing forensic related research projects.

PO 5. Effective Communication:
Communicate effectively their thoughts, opinions and findings related to professional conduct and social issues in the form of technical writing and oral presentations.

PO 6. Social Interaction and Effective Citizenship:
Interact wisely and smartly within the society with a focus on achieving their target without spoiling the societal harmony.

PO 7. Multicultural Competency and Leadership Readiness:
Foster self-confidence, self-awareness, leadership and collaborative skills to work in a multicultural and multidisciplinary environment.

PO 8. Ethics
Practice moral values and professional ethics while keeping up with their expertise and genuineness.

PO 9. Environment and Sustainability
Practice and follow the processes required for a sustainable, healthy and safe environment and will be abreast with the contextual knowledge of current environmental issues.

PO 10. Self-directed and Life-long Learning:
Acquire a habit of continuous self-learning through various online/offline learning platforms for personal academic/professional growth.

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Course Name: Basic Forensic science
Course code: 17050101

COURSE OUTCOMES

CO1: Know about the basics, history of Forensic science and the organizational set up of Forensic science laboratories.
CO2: Understand the structure and functioning of various international investigative agencies in combating crime.
CO3: Practice crime scene management and report various evidence found at scene of crime.
CO4: Apply knowledge related to IPC, CrPC, and IEA sections with respective to the crime investigated.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	-	-	-	-	-	-	2
CO2	2	3	2	-	1	1	-	-	1	2
CO3	3	3	3	2	-	1	-	-	1	3
CO4	3	1	1	1	1	1	-	1	1	3
Average	2.75	2.25	2.25	.75	.50	.75	-	.25	.75	2.50

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Course Name: Instrumentation-1

Course Code: 17050102

Course Outcomes:

CO1: To understand the basic concepts of Microscopic techniques

CO2: To understand about the Molecular Spectroscopic techniques.

CO3: To Introduce about the Chromatographic and Radiochemical techniques

CO4: To demonstrate the application of various instrumental techniques in the field of forensic science

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	1	-	-	-	-
CO2	3	3	3	3	1	1	-	-	-	-
CO3	3	3	3	3	1	1	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-
Average	3	3	3	3	1.3	1	-	-	-	-

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Course Name: Crime Scene Investigation
Course Code: 17050103

Course Outcomes:

CO1: Reconstruct a scene of crime.

CO2: Utilized Forensic Podiatry, Cheiloscopy in personal identification of suspect.

CO3: Describe and maintain Chain of custody in various cases.

CO4: Perform Crime scene photography.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	2	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	2	2	1	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	3
Average	3	2.2	2	1	0.2	0.2	-	0.7	-	1.7

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Course Name: Fundamentals of Fingerprint and Questioned Document Examination
Course Code: 17050104

Course Outcomes:

CO1: Students would be able to utilize various terminologies, history and various classificationsystem used in fingerprinting.

CO2: Students would be able to identify and compare the fingerprints on the basis of different ridge characteristics.

CO3: They would be able to compare handwriting and signature specimens.

CO4: Students would be able to examine the authenticity of printed documents and currencynotes.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	1	2	2	3	1	2	2	-	3
CO2	3	2	3	3	1	-	1	-	-	3
CO3	3	3	3	3	1	-	1	-	-	3
CO4	3	3	3	2	2	1	1	1	-	3
Average	3	2.25	2.75	2.5	1.75	1	1.25	1.5	-	3

Course Name: Forensic Chemistry
Course Code: 17050301

COURSE OUTCOMES:

CO1: Reconstruct arson related crime scenes.
CO2: Analyze adulteration in petroleum products.
CO3: Identify illicit and licit liquors and phenolphthalein in trap case.
CO4: Examine and identify chemical warfare agents and adulteration in metals and alloys

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	2	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	2	2	1	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	3
Average	3	2.2	2	1	0.2	0.2	-	0.7	-	1.7

Course Name: Forensic Toxicology
Course Code: 17050302

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COURSE OUTCOMES:

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CO1 Understand basics of forensic toxicology.
CO2: Understand in detail about poisons and their classification
CO3: Apply various forensic methods of extraction of poison from human body.
CO4: Understand types and trends of poisoning in India

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	2	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	2	2	1	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	3
Average	3	2.2	2	1	0.2	0.2	-	0.7	-	1.7

Course Name: Pharmacology and Pharmacokinetics
Course Code: 17050303

COURSE OUTCOMES:

CO1: Describe pharmacodynamics, pharmacokinetics, classification and the principles of drug administration
CO2: Describe antiseptics, disinfectants, insecticides with respect to forensic science.
CO3: Explain mechanism, metabolism and action of drugs on human body
CO4: Describe toxicity of commonly used drugs and drugs of abuse.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	2	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	2	2	1	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	3
Average	3	2.2	2	1	0.2	0.2	-	0.7	-	1.7

Course Name: Analytical Forensic Toxicology
Course Code: 17050304

COURSE OUTCOMES:

CO1: Describe basics of analytical forensic toxicology.
CO2: Apply various extraction methods for the extraction of various poison from human body fluids.
CO3: Analyze and purify the poisons using various analytical techniques.
CO4: Demonstrate and use various instrumental techniques for analysis of poisons.

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	2	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	2	2	1	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	3
Average	3	2.2	2	1	0.2	0.2	-	0.7	-	1.7

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Course Name: Elements of Forensic Biology and Serology

Course Code: 17050307

Course Outcomes:

CO1: Understand the importance of biological fluids (blood, semen, saliva and other body fluids) in crime investigations

CO2: Describe the importance, nature, collection and preservation of Hair evidence

CO3: Understand Blood grouping of different biological stains and its forensic relevance

CO4: Apply knowledge of immunology and serology for examination of various evidence

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	1	1	-	-	-	-
CO2	3	3	3	3	1	1	-	-	-	-
CO3	3	3	3	3	-	-	-	-	-	-
CO4	3	3	3	3	1	1	-	-	-	-
Average	3	3	3	3	0.725	0.725	-	-	-	-

Course Name: Forensic Botany, microbiology, entomology, and wildlife forensic

Course Code: 17050308

COURSE OUTCOMES

CO1: Describe Botanical evidences along with their Forensic significance.

CO2: Use entomological evidence for estimation of post-mortem interval, manner of death andsometimes the cause of death.

CO3: Differentiate between ante and post-mortem drowning along with the bearing the diatomshave in the investigation of probable place and time of drowning.

CO4: Describe the importance of wildlife in the field of forensic science.

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Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	1	2	3	1	-	2	-	1	3
CO2	3	3	3	3	2	-	2	-	1	3
CO3	3	3	3	3	2	-	2	-	1	3
CO4	3	2	2	1	2	-	3	3	3	3
Average	3	2.25	2.5	2.5	1.75		2.25	3	1.5	3

Course Name: Advanced Forensic Biology & Serology
Course Code: 17050309

Course Outcomes:

CO1: Understand the importance of biological fluids (blood, semen, saliva and other body fluids) in crime investigations
CO2: Describe the importance and procedure of species identification.
CO3: Understand blood grouping of different biological stains and its forensic relevance
CO4: Apply serological techniques for examination of body fluids and other biological evidence.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	-	-	-	-	2
CO2	3	3	2	3	2	1	-	-	-	2
CO3	3	3	3	3	2	1	1	1	1	2
CO4	3	3	3	3	2	1	1	-	1	2
Average	3	2.75	2.5	2.75	2	0.75	0.5	0.25	0.5	2

Course Name: Forensic Genetics & DNA Profiling
Course Code: 17050310

Course Outcomes:

CO1: Describe basic concepts of human genetics.
CO2: Understand the usefulness of genetic markers in forensic investigation along with the interpretation of a DNA profile.
CO3: Understand the need, progress, forensic significance and the legal importance of DNA profiling in various scenarios in India and abroad.
CO4: Use DNA statistics for calculations in different types of cases encountered in Forensic Science

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	2	3	-	-	-	-	2

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CO2	3	3	3	3	3	1	-	1	-	2
CO3	3	2	2	3	3	1	1	1	1	2
CO4	3	3	3	3	3	1	1	1	-	2
Average	3	2.75	2.5	2.75	3	0.75	0.5	0.75	0.25	2

Course Name: Forensic Ballistics

Course Code: 17050313

COURSE OUTCOMES

CO1: Understand the working of different firearms and composition of ammunition and bullet trajectory.

CO2: Explain Internal, External and terminal Ballistics.

CO3: Determine direction and range of fire.

CO4: Use comparison microscope for analysis of evidence related to Forensic Ballistics.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	1	2	2	-	3
CO2	3	3	3	2	-	-	1	2	-	3
CO3	3	3	3	2	-	-	1	3	-	3
CO4	3	3	3	2	1	1	1	2	-	3
Average	3	3	3	2	1	1	1.25	2.25	-	3

Course Name: Forensic Physics

Course Code: 17050314

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COURSE OUTCOMES

CO1: Describe the basics of Forensic Physics.

CO2: Understand the role of physical evidence in Forensic Physics.

CO3: Characterization and examination of voice as evidence.

CO4: Analyze and establish the authenticity of voice/tape evidence

Course outcomes and Program Outcomes Mapping:

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PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	1	2	2	-	3
CO2	3	3	3	2	-	-	1	2	-	3
CO3	3	3	3	2	-	-	1	3	-	3
CO4	3	3	3	2	1	1	1	2	-	3
Average	3	3	3	2	1	1	1.25	2.25	-	3

Course Name: Advanced Fingerprints and Questioned Documents Examination

Course Code: 17050315

Course Outcome:

CO1: Utilize various terminologies, history and various classification system used in fingerprinting.

CO2: Identify and compare the fingerprints on the basis of different ridge characteristics.

CO3: Compare and handwriting and signature specimens.

CO4: Analyze paper and ink samples

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	1	2	3	-	3
CO2	3	3	3	3	-	-	1	3	-	3
CO3	3	3	3	3	-	-	1	3	-	3
CO4	3	3	3	2	1	1	1	3	-	3
Average	3	3	3	2.5	1	1	1.25	3	-	3

Course Name: Forensic Psychology
Course Code: 17050319

Course Outcomes:

CO1: Explore their expertise in forensic psychology.
CO2: Use psychological assessment in understanding the criminal behavior.
CO3: Describe functioning of Polygraph, BEOS and Narco test.
CO4: Create awareness about the legal aspects and ethics of forensic psychology.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	3	2	3	1	2

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CO2	2	3	3	2	1	2	1	2	2	3
CO3	2	3	3	1	1	1	1	3	2	1
CO4	3	3	2	2	2	1	2	3	2	2
Average	2.5	3	2.75	2	1.5	1.75	1.5	2.75	1.75	2

Course Name: Forensic Biology and Serology
Course Code: 17050320

Course Outcomes:

CO1: Understand the importance of biological fluids (blood, semen, saliva and other body fluids) in crime investigations.
CO2: Explain the Forensic significance of Entomological evidence in Forensic Science.
CO3: Describe the importance of wildlife in the field of Forensic Science.
CO4: Perform and demonstrate various tests and DNA analysis for biological evidence.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	2	1	-	-	-	-	1
CO2	3	2	2	1	1	-	-	-	-	1
CO3	3	2	2	1	1	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	2
Average	3	2.5	2.25	1.75	1	-	-	-	-	1

Course Name: Forensic Chemistry and Toxicology
Course Code: 17050321

Course Outcomes:

CO1: Students would be able to know about the basic of Forensic Chemistry.
CO2: Students would be able to describe Drugs of abuse, petroleum products, liquors and explosives.
CO3: Students would be able to know about the Forensic Toxicology and different Poisons.
CO4: Students would be able to know about the Drugs of Abuse, Club drugs, Toxins and Poisons.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	2	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	2	2	1	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	3
Average	3	2.2	2	1	0.2	0.2	-	0.7	-	1.7

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Faculty of Science

Department of Mathematics

Program Specific Outcomes (M.Sc- Mathematics)

On successful completion of the program the student will be able to:

1. **Disciplinary Knowledge:** Develop the capability of demonstrating comprehensive knowledge in pure and applied mathematics.

2. **Critical Thinking & Problem Solving:** Analyze the mathematical results and use them to solve various real world problems in mathematics as well as in other related scientific domains.

3. **Analytical/Scientific Reasoning:** Apply appropriate techniques for the qualitative and quantitative analysis of mathematics and explore the scientific reasoning for the obtained results.

4. **Research-related Skills:** Develop the capability of writing basic research project in emerging areas of pure and applied mathematics.

5. **Social Interaction & Effective Citizenship:** Prepare students to gain the social competency and skills to handle the growing and ever widening mathematical origin requirements in the civilization.

6. **Effective Communications:** Explain the complex mathematical problems through technical report writing, documentation, poster/oral presentation and group discussion during seminars, workshops and conferences.

7. **Multi-culture competence & Leadership Readiness:** Work effectively either independently or as a team leader while being adaptable to various multicultural professional environments.

8. **Environment & Sustainability:** Understand the impact of the mathematics to solve various problems in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

9. **Ethics:** Identify unethical behaviour such as fabrication, falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects.

10. **Self-directed and Life-long learning:** Work independently, do in-depth study of various notions of mathematics and inculcate the habits of self-learning to lead.

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Course Name: Real Analysis **Course Code: 17070101**

Course Outcomes:

CO1: To demonstrate the knowledge of Riemann Stieltjes integral, behavior of sequences and series of functions.
CO2: To enable for solving real world problems in scientific domains using Weierstrass's approximation theorem.
CO3: To apply concepts of mathematical analysis like power series, Fourier series, gamma functions etc.
CO4: To apply fixed point theorems for solving research based problems such as differential equations, Integral equations and fractional calculus.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	-	2	-	-	-	2
CO2	3	3	3	2	-	3	-	-	-	2
CO3	3	3	3	2	-	2	-	1	-	2
CO4	3	3	2	3	-	3	-	-	-	2
Average	3	3	2.7	2.25	-	2.5	-	0.25	-	2

Course Name: Measure Theory **Course Code: 17070102**

Course Outcomes:

CO1: To understand the basic concepts of measure, Lebesgue integral and their properties.
CO2: To analyze the mathematical problem using the Lebesgue integral and understand the applications of Lp-spaces in probability theory.
CO3: To describe the construction of product measure and to apply Fubini's theorem in real life problems.
CO4: To understand the basic of Regular Borel measures, Integration of continuous functions with compact support, Riesz-Markoff's theorem to describe research based problems.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	-	2	-	-	-	2
CO2	3	2	3	3	-	3	-	-	-	3
CO3	3	3	3	2	1	2	-	-	-	2
CO4	3	3	2	3	1	3	-	-	-	2
Average	3	2.75	2.75	2.5	0.5	2.5	-	-	-	2.25

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Course Name: Linear Algebra Course Code: 17070103

Course Outcomes:

1. To demonstrate about basic knowledge of vector space such as linear space, Subspace, linear dependence and linear transformations.
2. To apply linear transformations & theirs properties for solving mathematical and computational problems such as computer graphics
3. To analyze mathematical problems using Jordan canonical form, spectral theorem and Gram-Schmidt orthonormalization.
4. To discuss well-known research problems regarding Bilinear transformations, Inner product and diagonalization.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	2	_	_	_	_	3
CO2	3	3	3	2	2	_	_	_	_	3
CO3	3	3	3	2	2	_	_	_	_	3
CO4	3	3	3	3	2	_	_	_	_	3
Average	3	3	3	2.25	2	_	_	_	_	3

Course Name: Complex Analysis Course Code: 17070104

Course Outcomes:

CO1: To understand the basic knowledge of analycity of complex valued functions, Riemann Zeta function, Schwarz Reflection principle and their properties.
CO2: To evaluate definite integrals using Maximum modulus principle, Minimum modulus principle and Residue theorem.
CO3: To apply Taylor and Laurent series to expend complex valued functions and their applications to evaluate the residue.
CO4: To solve research problems of algebraic geometry, number theory and many problems arising in solid and fluid mechanics.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	-	2	-	-	-	2
CO2	3	3	3	3	-	3	-	-	-	3
CO3	3	3	3	2	-	2	-	-	-	2
CO4	3	3	3	3	-	3	-	-	-	3
Average	3	3	3	2.5	-	2.5	-	-	-	2.5

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Course Name: Ordinary Differential Equations **Course Code: 17060105**

Course Outcomes:

CO1: To prepare scientific data and try to find numerical explanations using suitable methods related to advanced differential equations.

CO2: To solve basic problems, to move flexibly between the representations using different differential equations methods in concrete situations.

CO3: To apply different methods as Bernoulli Differential Equations, Euler's methods and Laplace methods.

CO4: To develop differential equation based methods to relate the positive effect of environment, epistemological and motivational beliefs.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	-	1	-	-	-	1
CO2	3	2	2	3	1	-	-	1	-	-
CO3	3	2	2	3	-	1	-	-	-	1
CO4	2	3	2	2	1	-	1	-	1	-
Average	2.75	2.25	2	2.75	0.5	0.5	0.25	0.25	0.25	0.5

1 Weakly 2 Moderately 3 Strongly

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Faculty of Science

Department of Mathematics

Program Specific Outcomes (M.Sc- Mathematics)

On successful completion of the program the student will be able to:

1. **Disciplinary Knowledge:** Develop the capability of demonstrating comprehensive knowledge in pure and applied mathematics.

2. **Critical Thinking & Problem Solving:** Analyze the mathematical results and use them to solve various real world problems in mathematics as well as in other related scientific domains.

3. **Analytical/Scientific Reasoning**: Apply appropriate techniques for the qualitative and quantitative analysis of mathematics and explore the scientific reasoning for the obtained results.

4. **Research-related Skills:** Develop the capability of writing basic research project in emerging areas of pure and applied mathematics.

5. **Social Interaction & Effective Citizenship:** Prepare students to gain the social competency and skills to handle the growing and ever widening mathematical origin requirements in the civilization.

6. **Effective Communications:** Explain the complex mathematical problems through technical report writing, documentation, poster/oral presentation and group discussion during seminars, workshops and conferences.

7. **Multi-culture competence & Leadership Readiness:** Work effectively either independently or as a team leader while being adaptable to various multicultural professional environments.

8. **Environment & Sustainability:** Understand the impact of the mathematics to solve various problems in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

9. **Ethics:** Identify unethical behaviour such as fabrication, falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects.

10. **Self-directed and Life-long learning:** Work independently, do in-depth study of various notions of mathematics and inculcate the habits of self-learning to lead.

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Course Name: Discrete Mathematics **Course Code: 17070301**

Course Outcomes:

CO1: To discuss the validity of arguments using logical operators, Boolean algebra as lattices and Graph theory.

CO2: To apply Boolean algebra in switching theory such as AND, OR and NOT gates.

CO3: To analyze several mathematical and computational problems through graph theory.

CO4: To design and construction of a combinatorial circuit from a verbal description.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	-	1	-	-	-	2
CO2	3	3	2	1	1	-	-	1	-	2
CO3	3	3	3	3	2	1	-	2	-	2
CO4	2	2	3	2	1	-	-	-	-	2
Average	2.75	2.5	2.5	1.75	1	0.5	-	0.75	-	2

Course Name: Special Functions **Course Code: 17070304**

Course Outcomes:

CO1: To understand the basic concepts of Gamma and Beta functions and their properties.

CO2: To analyze the generating functions, recurrence relation and Rodrigue's formulas of the various orthogonal polynomials.

CO3: To determine the various integrals in terms of Hypergeometric and Confluent hyper geometric functions.

CO4: To solve many research problems of computational fluid dynamics using special functions.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	-	1	-	-	-	1
CO2	3	3	2	3	1	-	-	1	-	-
CO3	3	3	3	3	1	-	-	1	-	-
CO4	2	2	3	2	1	-	-	1	-	-
Average	2.75	2.5	2.5	2.75	0.75	0.25	0	0.75	0	0.25

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Course Name: Numerical analysis and its application **Course Code: 17070307**

Course Outcomes:

CO1: Student will know about the Basics of Numerical Analysis

CO2: Student will be able to understand System of Linear Algebraic Equations and Eigen Value Problems

CO3: Student will be able to understand Numerical Solution of Ordinary Differential Equations

CO4: Student will be able to understand Numerical Solution of Partial Differential Equations.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	2	1	1	1	-	-	1
CO2	3	3	2	1	1	1	1	1	-	2
CO3	3	3	2	1	1	1	1	1	-	2
CO4	3	3	2	3	1	1	1	1	1	2
Average	3	3	2.25	1.75	1	1	1	.75	.25	1.75

Course Name: Mathematical Programming **Course Code: 17070311**

Course Outcomes:

1. To apply advanced analytical methods to help make better decisions and optimizing system performance.
2. To understand decision maker's behaviours using different optimization tools.
3. To apply different optimization methods as different linear programming and non-linear programming models.
4. To explain research problems in Operations Research human factor is an important component. Without human factor Operations Research study is incomplete.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	2	–	–	–	–	3
CO2	3	3	2	2	2	–	–	–	–	3
CO3	3	3	2	2	2	–	–	–	–	3
CO4	3	3	3	3	2	–	–	–	–	2
Average	3	3	2.5	2.5	2	–	–	–	–	2.75

1 Weakly **2 Moderately** **3 Strongly**

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Faculty of Science

Department of Physics

Program Specific Outcomes (M.Sc. Physics)

On successful completion of the Programme, students will have the ability to:

1. **Physics knowledge**: Demonstrate the comprehensive knowledge of both theoretical and experimental physics in the various fields like Electronics, Condensed Matter Physics and Nuclear Physics.

2. **Critical Thinking and Problem Solving:** Apply their theoretical and experimental knowledge of physics in solving complex problems, and conceptualizing their solutions.

3. **Analytical/Scientific Reasoning**: Use their scientific potential to analyze scientific data and reconsider alternative explanation to reach a final conclusion for any given scientific assignment.

4. **Research related skills:** Use their research-based knowledge and given methods to plan and write basic Physics research projects and complete them successfully while keeping in mind the rules and regulations pertaining to different scientific research project operations.

5. **Effective Communication**: Communicate effectively the subject knowledge through technical writings as well as oral presentations among the scientific community and society.

6. **Social Interaction and Effective Citizenship:** Engage as an effective citizen in social welfare initiatives by providing information and resources, using appropriate physics-based techniques that contribute to the future development of the nation.

7. **Multicultural Competency and Leadership Readiness:** Demonstrate knowledge and understanding needed for the future technological advances effectively as an individual or as a team leader while being adaptable to various multicultural professional environments.

8. **Ethics:** Practice ethical awareness, exercise empathy and a caring attitude while maintaining professional integrity, honesty and high ethical standards.

9. **Environment and Sustainability:** Design physics-based devices and demonstrate them experimentally to meet the specific needs in regard to sustainable development and environmental safety.

10. **Self-directed and Life-long Learning:** Inculcate a habit of self-learning in the broadest context of scientific and technological changes for personal and academic growth as well as for increasing their employment opportunities.

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Course Name: Mathematical Physics **Course Code-17080101**

Course Outcomes:

CO1. Analyse various techniques to solve differential equations.

CO2. To be able to use special functions in various physics problems.

CO3. Use complex analysis in solving physical problems.

CO4. Use the orthogonal polynomials and other special functions;

CO5. Use Fourier series and integral transformation.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	1	-	-	-	2	1
CO2	3	3	3	3	2	1	-	-	3	1
CO3	3	2	2	2	-	-	-	-	1	2
CO4	3	2	3	3	2	1	-	-	2	2
Average	3	2.5	2.5	2.75	1.25	0.5	-	-	2	1.5

Course Name: Classical Mechanics **Course Code-17080103**

Course Outcomes:

After the successful completion of the course, students would be able to

CO1. To apply the basics involved in the small oscillation and related Hamilton equation and experimental physics as rigid body dynamics with transformation

CO2. To apply their theoretical, experimental knowledge and conceptualizing their solutions

CO3. To be able to use classical mechanics' scientific potential to analyze scientific ideas and explanations.

CO4. To be able to demonstrations and learning of research-based knowledge of different system dynamics, mechanics based practical and project.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	1	-	-	-	2	1
CO2	3	3	3	3	2	1	-	-	3	1
CO3	4	2	2	2	-	-	-	-	1	2
CO4	3	2	3	3	2	1	-	-	2	2
Average	3.25	2.5	2.5	2.75	1.25	0.5	-	-	2	1.5

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Course Name: Professional ethics and human values **Course Code: 17080107**

Course Outcomes:

CO1: The students will understand the values of ethics and moral values deeply.
CO2: The students will understand the value of environment and respect for nature.
CO3: The students will realize the values of responsible citizens to work for the society.
CO4: The students will be able to take strong decisions and perform their duties responsibly as a professional.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1	3	-	2	2	3	3
CO2	3	1	2	2	3	1	1	3	3	3
CO3	1	1	2	1	3	2	3	2	3	3
CO4	1	2	2	1	3	2	3	3	3	3
Average	2	1.5	2	1.25	3	1.67	2.25	2.5	3	3

1 Weakly **2 Moderately** **3 Strongly**

Course Name: Computational Methods & Programming (Matlab/Python),

Course Code-17080108

Course Outcomes:

CO1. To have basic understanding of MATLAB /Python and be able to design, code, and test small programs.

CO2. Be fluent in the use of procedural statements assignments, conditional statements, and loops.

CO3. Self-directed and Life-long Learning.

CO4. Provide an introduction to the Python programming language.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	1	-	-	-	2	1
CO2	3	3	3	3	1	1	-	-	2	1
CO3	3	3	2	3	-	-	-	-	2	2
CO4	3	3	2	3	-	1	-	-	2	2
Average	3	2.75	2.25	3	0.25	0.25	-	-	2	1.5

1 Weakly **2 Moderately** **3 Strongly**

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Department of Physics

Program Specific Outcomes (M.Sc. Physics)

On successful completion of the Programme, students will have the ability to:

1. **Physics knowledge**: Demonstrate the comprehensive knowledge of both theoretical and experimental physics in the various fields like Electronics, Condensed Matter Physics and Nuclear Physics.

2. **Critical Thinking and Problem Solving:** Apply their theoretical and experimental knowledge of physics in solving complex problems, and conceptualizing their solutions.

3. **Analytical/Scientific Reasoning**: Use their scientific potential to analyze scientific data and reconsider alternative explanation to reach a final conclusion for any given scientific assignment.

4. **Research related skills:** Use their research-based knowledge and given methods to plan and write basic Physics research projects and complete them successfully while keeping in mind the rules and regulations pertaining to different scientific research project operations.

5. **Effective Communication**: Communicate effectively the subject knowledge through technical writings as well as oral presentations among the scientific community and society.

6. **Social Interaction and Effective Citizenship:** Engage as an effective citizen in social welfare initiatives by providing information and resources, using appropriate physics-based techniques that contribute to the future development of the nation.

7. **Multicultural Competency and Leadership Readiness:** Demonstrate knowledge and understanding needed for the future technological advances effectively as an individual or as a team leader while being adaptable to various multicultural professional environments.

8. **Ethics:** Practice ethical awareness, exercise empathy and a caring attitude while maintaining professional integrity, honesty and high ethical standards.

9. **Environment and Sustainability:** Design physics-based devices and demonstrate them experimentally to meet the specific needs in regard to sustainable development and environmental safety.

10. **Self-directed and Life-long Learning:** Inculcate a habit of self-learning in the broadest context of scientific and technological changes for personal and academic growth as well as for increasing their employment opportunities.

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Course Name: Lasers and its applications **Course Code: 17080301**

Course Outcomes:

After the successful completion of the course, students would be able to

CO1: Describe spontaneous and stimulated emission, population inversion and other basic concepts of LASER.

CO2: Describe properties of LASER and various methods of pulsing techniques.

CO3: Understand the construction and working of different types of LASER

CO4: Understand the applications of different LASERs

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	1	-	-	-	-	-	2
CO2	3	3	3	1	1	-	-	-	-	1
CO3	3	3	3	2	1	1	-	-	-	2
CO4	1	3	3	3	2	1	1	1	2	3
Average	3	3	3	2	1	1	1	1	2	2

1 Weakly 2 Moderately 3 Strongly

Course Name: Digital Electronics **Course Code: 17080305**

Course Outcomes:

After successful completion of the course, students will

CO1. have a basic knowledge of various number system and Boolean Algebra.

CO2. understand the concept of working of different types of logic gates.

CO3. be able to design the electronic circuits like Flip Flop, RAM, ROM using different types of logic gates.

CO4. Understand the basic of shift registers & counters and their uses in design of advance electronic equipments.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	1	-	-	-	-	-	2
CO2	3	3	3	1	1	-	-	-	-	1
CO3	3	3	3	2	1	1	-	-	-	2
CO4	1	3	3	3	2	1	1	1	2	3
Average	3	3	3	2	1	1	1	1	2	2

1 Weakly 2 Moderately 3 Strongly

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Course Name: Basic Concepts in Condensed Matter Physics **Course Code-17080309**

CO1. The students will be able to apply the theoretical concepts of X-ray diffraction in crystals experimentally

CO2. Students will be able to explain and differentiate between the metals, insulators and semiconductors based upon the knowledge of band theory

CO3. Students will be able to understand the thermal properties of the solids and calculate the specific heats of the solids.

CO4. Based upon the theoretical concepts, students can calculate the crystal energies and analyze the types of bonding

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	1	-	-	-	2	1
CO2	3	3	3	3	2	1	-	-	3	1
CO3	4	2	2	2	-	1	-	-	1	2
CO4	3	2	3	3	2	1	-	-	2	2
Average	3.25	2.5	2.5	2.75	1.25	0.75	-	-	2	1.5

1 Weakly 2 Moderately 3 Strongly

Course Name: Condensed Matter Physics: Physical Properties Course Code: 17080311

Course Outcomes:

CO1. The students will be able to find out about dielectric and ferroelectric materials

CO2. The student will come to know about the optical properties of solids which play an important role in crystal structure determination

CO3. Student will know the magnetic parameters and will be able to find potential materials for magnetic applications

CO4. Hall effect knowledge will make the students to recognize the p- or n-type semiconductors

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	1	1	1	-	2	1
CO2	3	2	3	2	1	1	1	-	3	1
CO3	3	2	2	2	1	1	1	-	1	1
CO4	3	2	2	2	1	2	1	-	1	1
Average	3	2	2.25	2	1	1.25	1	-	1.75	1

1 Weakly 2 Moderately 3 Strongly

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Course Name: Advanced Condensed Matter Physics **Course Code: 17080313**

Course Outcomes:

CO1. The students will have information about the carbon-based materials

CO2. Student will get basic knowledge about properties of different materials which have a wide range of applications in different spheres.

CO3. Students will be able to understand the ferroelectric phase transitions of first and second order.

CO4. The students will be exposed to different characterization techniques used in experimental condensed matter physics.

Course outcomes and Program Outcomes Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	3	1	1	1	-	1	1
CO2	3	2	2	1	1	1	1	-	-	1
CO3	3	2	1	2	1	1	1	-	-	1
CO4	3	1	1	3	1	2	1	-	1	1
Average	**3**	**2.25**	**1.5**	**2.25**	**1**	**1.25**	**1**	**-**	**0.5**	**1**

1 Weakly **2 Moderately** **3 Strongly**

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