# X. FACULTY OF SCIENCE

## DEPARTMENT OF ANTHROPOLOGY

### ABOUT THE DEPARTMENT

The Department was established in 1960. During the last more than six decades, the Department has not only grown in terms of personnel, equipment and laboratories, and library, it has contributed significantly to the furtherance of anthropological teaching and research in the country.

Infrastructure and Laboratory facilities for teaching and research are available in Anthropology, Osteology, Serology and Bio-chemical Anthropology, Paleoanthropology and Prehistoric Archaeology, Socio-Cultural Anthropology, Dermatoglyphics, Forensic Anthropology, Molecular Anthropology. The unique 'S.R.K. Chopra Museum of Man' in the Department has a Gallery of Fossil Apes, Primates and Man which includes life-size models, and an Ethnographic Gallery which includes items of material culture. Fieldwork is organized by the Department where students are given instructions in the field and research methods and based on empirical work they write project reports.

The Department was recognized as one of the centers under UGC Programme of Special Assistance and Departmental Research Support in 1988, this programme was extended up to 2009. The Department has also been selected for support under UGC assistance for strengthening of the infrastructure of the Humanities & Social Science (ASIHSS) Programme in Anthropology for a period of five years i.e. 1-4-2005 – 31-3-2010. From 2010-2011, the Department has been granted DST – FIST and is also a UGC Centre of Advanced Study (CAS) in Anthropology (2011-2016). The Department has also been awarded CAS-II by the UGC from April 2018 to March 2023.

The faculty of the Department has been handling various research & consultancy projects from prestigious National/State funding agencies. Recently, the faculty has published in the coveted and high impact factors journals such as *The Lancet, Nature, Climacteric, PLOS-ONE, American Journal and Physical Anthropology*.

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professors | A.K. Sinha | Social Anthropology |
| | Abhik Ghosh | Social Anthropology |
| | Kewal Krishan | Physical Anthropology |
| Assistant Professors | Maninder Kaur **(Chairperson)** | Physical Anthropology |
| | Ramesh Sahani | Physical Anthropology |
| | Jagmahender Singh | Physical Anthropology |
| Assistant Professor-cum-Curator | Gayathiri Pathmanathan | Physical Anthropology |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Hons.) under the Framework of Honours School System | 30+4 NRI +2 Foreign National | 3 years | Passed 10+2 class with 50% marks with English, Physics, Chemistry, Mathematics / Biology from recognized Board /CBSE | Based on PU-CET (UG) Academics: 25% PU-CET (UG): 75% |
| M.Sc. (Hons.) under the Framework of Honours School System | 23+3NRI +1 Foreign National | 2 years | B.Sc. (Hons. School) Anthropology or B.A./B.Sc. with 50 % from P.U. or any other recognized University | Based on Merit |
| Diploma in Forensic Science & Criminology | 20+2**+2 NRI +1 Foreign National | 1 year | (a) Bachelor's Degree of P.U. subject to having +2 with Science or any equivalent exam or (b) An equivalent examination of any other University recognized by Syndicate as equivalent to (a) above with 50 % Marks | Based on Merit |
| Ph.D. | Subject to availability | 3-6 Years | See Ph.D. Prospectus 2022 | |

* 5% Concession is admissible in eligibility marks to ST/SC/BC/PwD candidates
** For Govt. Sponsored in service Police Personnel

**TITLE OF SYLLABI:** Detailed course curriculum is available at http://puchd.ac.in/syllabus.php

### B.Sc. (Hons.) (Under CBCS system)

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| **Core Subject** (Theory & Practical) | | **Core Subject** (Theory & Practical) | |
| ANTH-C1 | Introduction to Biological Anthropology | ANTH-C3 | Archaeological Anthropology |
| ANTH-C2 | Introduction to Socio-cultural Anthropology | ANTH-C4 | Fundamentals of Human Origins & Evolution |
| ANTH-AECC1 | English | ANTH-AECC2 | Environmental Science |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| (Theory & Practical) | | (Theory & Practical) | |
| ANTH-C5 | Tribes and Peasants in India | ANTH-C8 | Theories of Culture and Society |
| ANTH-C6 | Human Ecology: Biological & Cultural Dimensions | ANTH-C9 | Human Growth and Development |

| | | | |
|---|---|---|---|
| ANTH-C7 | Biological Diversity in Human Populations | ANTH-C10 | Research Methods |
| SEC-I | Skill Enhancement Course | SEC-II | Skill Enhancement Course |
| **SEMESTER-I** | | **SEMESTER-I** | |
| **General Elective :** (Theory & Practical) | | **General Elective :** (Theory & Practical) | |
| ANTH-GE1 | Introduction to Anthropology | ANTH-GE2 | Biological Anthropology |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| (Theory & Practical) | | (Theory & Practical) | |
| ANTH-GE3 | Fundamental of Palaeo anthropology | ANTH-GE4 | Human Growth & Human Genetics |
| **SEMESTER-V** | | **SEMESTER-VI** | |
| (Theory & Practical) | | (Theory & Practical) | |
| ANTH-C11 | Human Population Genetics | ANTH-C13 | Forensic Anthropology |
| ANTH-C12 | Anthropology in Practice | ANTH-C14 | Anthropology of India |
| ANTH- DSE-1 | Human Genetics **OR** | ANTH- DSE-5 | Physiological Anthropology **OR** |
| ANTH-DSE-2 | Demographic Anthropology | ANTH- DSE-6 | Visual Anthropology |
| ANTH-DSE-3 | Paleoanthropology **OR** | ANTH- DSE-7 | Anthropology of Health **OR** |
| ANTH-DSE-4 | Tribal Cultures of India | ANTH- DSE-8 | Dissertation |

**M.Sc. (Hons.)**

| **SEMESTER-I** | | **SEMESTER-II** | |
|---|---|---|---|
| ANTH-C101 | Archaeological Anthropology and Palaeoanthropology | ANTH-C201 | Anthropological Methods & Techniques |
| ANTH-C102 | Biological Anthropology | ANTH-C202 | Museum Studies |
| ANTH-C103 | Social-Cultural Anthropology | ANTH-C203 | Human Genetics |
| DSE-2 | Medical Anthropology **OR** | DSE-12 | Urban Anthropology **OR** |
| DSE-15 | Human Growth, Development & Nutrition | DSE-7 | Prehistoric Archaeology and Palaeoanthropology - Concepts & Palaeolithic cultures |
| SEC- 1 | Field Methodology | SEC-2 | Anthropology of SIA |
| **SEMESTER-III** Compulsory papers | | **SEMESTER-IV** Compulsory papers | |
| ANTH-C301 | Anthropological Theories | ANTH-C401 | Demography and Biostatistics |
| ANTH-C302 | Human Ecology and Adaptation | ANTH-C402 | Applied Anthropology |
| ANTH-C303 | Anthropology of India | ANTH-C403 | Dissertation and viva-voce |
| DSE-5 | Human Biological Variation **OR** | DSE-10 | Anthropology of Food **OR** |
| DSE-11 | Symbolic Anthropology | DSE-20 | Forensic Anthropology |
| SEC-3 | Documentation of Intangible Cultural Heritage | | |

**Diploma in Forensic Science & Criminology**

| **SEMESTER-I** | | **SEMESTER-II** | |
|---|---|---|---|
| DFSc 1.1 | Fundamentals of Forensic Science -I | DFSc 2.1 | Fundamentals of Forensic Science -II |
| DFSc 1.2 | Forensic Anthropology-I | DFSc 2.2 | Forensic Anthropology-II |
| DFSc 1.3 | Forensic Physical Sciences-I | DFSc 2.3 | Forensic Physical Sciences-II |
| DFSc 1.4 | Criminology & Criminal Law-I | DFSc 2.4 | Criminology & Criminal Law-II |
| DFSc 1.5 | Practical in Forensic Science-I | DFSc 2.5 | Practical in Forensic Science-II |

**THRUST AREAS:** Palaeoanthropology and Molecular Anthropology; Human Ecology in North-West India; Continuity & Change; and Bio-cultural Correlates of Health and Disease.

**PLACEMENTS:** Our students have worked for companies like Boeing and Nokia. They have worked as Director of Forensic Science Institute & ICMR and leading Departments in PGIMER & GMCH-32, Chandigarh. Many have gone aboard and are working in premier institutes and universities there. We are attempting to contact other organizations where high level placements may be provided in the future. We are attempting to get our students placed through individual's efforts and through the University Placement Cell. Our students received employment as Assistant Professors in the Universities and Institutions; Research Officer in Tribal Development (H.P.), Assistant Anthropologist in Anthropological Survey of India; Research Officer in Indira Gandhi National Centre for the Arts. Our students have been admitted in advanced Masters' courses in USA/Canada on the basis of their post-graduation in Anthropology from this Department.

**ALUMNI ASSOCIATION:** We have an Alumni Association, though in a very nascent stage. Prestigious alumni sometimes come to the Department and at that point an interaction is organized with the faculty and students. The last such interaction was with Dr. Sarabjit Mastana, of Loughborough University, U.K. and Mr. Sandeep Sharma on 3-2-2017. Alumni of the Department deliver special lectures to the students of the department. In 2021, two prominent alumni were honored at an online function.

## DEPARTMENT OF BIOCHEMISTRY

**ABOUT THE DEPARTMENT:**

Department of Biochemistry was started in 1962 and has grown steadily and is now recognized as an important centre of research and teaching in the country. Our teaching oriented Department provides many opportunities for prospective students who can acquire thorough training and degree in contemporary Biochemistry through our honors program: B.Sc., M.Sc. and

Ph.D. Our Department attracts the best students and provides an excellent foundation for future, be it in research, academics or industry.

The department has qualified, regular and competent faculty with Ph.D. from various institutes of national and international repute. The faculty members of the department are engaged in the research in the areas of Biosensors, Cancer Biology, Industrial biotechnology, Immunology, Membrane Biology, Microbial Biochemistry and Stress response, Neurobiology (fields in the order of Alphabets). The Department is recognized for funding under the Special Assistance Programme of the University Grant Commission. The Department has several sophisticated instruments such as GC-MS, High Speed Centrifuges, UV-Vis Spectrophotometers, Thermocycler, Gel-Doc, Lyophiliser, Spectrofluorimeter, HPLC, Ultracentrifuge and flowcytometer for enhancing research facilities.

The opportunities for Ph.D. are varied and designed to provide solid training as an independent and research scientist, both, in academic as well as industrial settings. Our alumni occupy important positions in India and abroad.

**FACULTY**

| **Designation** | **Name** | **Field of Research Specialization** |
|---|---|---|
| Emeritus Professor | Akhtar Mahmood | Membrane Transport |
| Professors | Archana Bhatnagar | Immunology |
| | Rajat Sandhir | Neurochemistry |
| | Sukesh Chander Sharma | Stress Biochemistry |
| | Navneet Agnihotri | Cancer Biology |
| | **(Chairperson)** | |
| | Amarjit S. Naura | Lung & Molecular Immunology |
| Associate Professor | Dipti Sareen | Microbial Biochemistry |
| Assistant Professor | Nirmal Prabhakar | Analytical Biochemistry |

**COURSES OFFERED: (SEMESTER SYSTEM)**

| **Course** | **Seats** | **Duration** | **Eligibility*** | **Admission Criteria** |
|---|---|---|---|---|
| B.Sc. (Hons.) under the framework of Honours School System | 25 + 4NRI + 2 Foreign National | 3 Years | A candidate should have passed 10+2 examination with atleast 50% marks with English, Physics, Chemistry, mathematics / Biology from recognized Board/CBSE. | Based on PU-CET (UG)<br>Academics: 25%<br>PU-CET(UG): 75% |
| M.Sc.(Biochemistry) under the framework of Honours School System** | 30# + 4NRI + 2 Foreign National | 2 Years | (i) B.Sc. (Hons.) Biochemistry or its equivalent exam.<br>(ii) B.Sc. (Hons.) in any subject under CBCS with 24 Credits in Biochemistry as Generic Elective subject<br>(iii) 50% marks in B.Sc. (Pass or Hons.) exam. of the P.U. or any other exam. recognized by P.U. Students should have passed Biochemistry as an elective subject for three years. | After admitting all the ongoing students of B.Sc. (H.S) 3rd year, vacant seats will be filled with candidates on the basis of entrance Test-PU-CET (PG).<br>Academics: 40%<br>PU-CET (UG):60% |
| Ph.D. | Subject to availability | 3-6 years | See Ph.D. Prospectus 2022 | |

*5 % Concession is admissible in eligibility marks to SC/ST/BC/PwD Candidates
**Student of B.Sc. (MLT) departments are not eligible.
#vacant seats will be declared after admitting al the ongoing students of B.Sc. (Hons.) 3rd year.

**TITLE OF SYLLABI:** Detailed syllabi available at https://puchd.ac.in/syllabus.php

**B.Sc. (Hons.) COURSE STRUCTURE (2022-23)**

| **SEMESTER-I** | | **SEMESTER-II** | |
|---|---|---|---|
| C1 | BCH-C1: Biomolecules | C3 | MIC-C3: General Microbiology |
| C2 | BPH-C2: Cell Biology | C4 | BTC-C4: Molecular Biology |
| AECC1 | BCH-AECC1: English | AECC2 | BCH: AECC2: Environmental Science |
| GE1* | | GE2* | |

**Four core courses will run simultaneously in both semesters in the 1st year under PU-IBMSER.**

| **SEMESTER III** | | **SEMESTER IV** | |
|---|---|---|---|
| C5 | BCH-C5: Carbohydrates: Structure & Metabolism | C8 | BCH-C8: Lipids: Structure & Metabolism |
| C6 | BCH-C6: Nitrogenous Compounds: Structure & Metabolism I | C9 | BCH-C9: Nitrogenous Compounds: Structure & Metabolism II |
| C7 | BCH-C7: Membrane Biology & Bioenergetics | C10 | BCH-C10: Enzymes & Enzyme Kinetics |
| SEC1** | | SEC2** | |
| GE3* | | GE4* | |
| **SEMESTER V** | | **SEMESTER VI** | |
| C11 | BCH-C11: Immunology | C13 | BCH-C13: Endocrinology |

| | | | |
|---|---|---|---|
| C12 | BCH-C12: Molecular Biology: From Genes to Proteins | C14 | BCH-C14: Regulation of Gene Expression & Development |
| DSE1# | | DSE3# | |
| DSE2# | | DSE4# | |
| C:Core Courses; GE: Generic Elective; AECC: Ability Enhancement Compulsory Courses; SEC: Skill Enhancement Courses; DSE: Discipline Specific Elective.<br>*:GE subjects are to be selected by the students from the pool of GE Subjects offered by various Departments of the University. | | | |

****SKILL ENHANCEMENT COURSES (any one per semester in semesters 3-4)**

1. BCH-SEC1: Tools and techniques in Biochemistry
2. BCH-SEC2: Protein purification Techniques
3. BCH-SEC3: Introduction to Biomedical Lab Diagnostics
4. BCH-SEC4: Bioinformatics
5. BCH-SEC5: Recombinant DNA Technology

**#DISCIPLINE SPECIFIC ELECTIVE COURSES (any two per semester in semesters 5-6)**

1. BCH-DSE1: Physiological Biochemistry / Microbial Biochemistry
2. BCH-DSE2: Plant Biochemistry / Molecular Basis of Non-Infectious Human Diseases
3. BCH-DSE3: Neurobiology / Molecular Basis of Infectious Diseases
4. BCH-DSE4: Nutritional Biochemistry / Cancer Biology

** and #Courses under these will be offered only if a minimum of 10 students opt for the same.

**GENERIC ELECTIVE SUBJECTS (Offered by Biochemistry Department) for students of other departments**

1. BCH-C-GE1: Biochemistry of Cell
2. BCH-C-GE2: Proteins and Biomembranes
3. BCH-C-GE3: Enzymes and Bioenergetics
4. BCH-C-GE4: Intermediary Metabolism

**M.Sc.**

**COURSE STRUCTURE (2022-23)**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| 1. | MBCH C1: Application of Biochemistry to Biotechnology | 1. | MBCH C5: Molecular Cell Biology |
| 2. | MBCH C2: Clinical Biochemistry | 2. | MBCH C6: Advanced Enzymology |
| 3. | MBCH C3: Biochemical Toxicology | 3. | MBCH C7: Molecular & Cellular Immunology |
| 4. | MBCH C4: Combined Practical | 4. | MBCH C8: Combined Practical |
| 5. | MBCH GE 1: Swayam – I* | 5. | MBCH GE2: Swayam – II* |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| 1. | MBCH C9: Genomics and Bioinformatics | 1. | MBCH C14: Seminar on Advanced Topics in Biochemistry |
| 2. | MBCH C10: Computational Techniques & Biostatistics | 2. | MBCH C15: **Research work (Thesis) |
| 3. | MBCH C11: Comprehensive Examination (Based on UGC/ CSIR Syllabus) | 3. | MBCH C16: Research work (Viva-Voce) |
| 4. | MBCH C12: Paper presentation on Recent Topics in Biochemistry | | |
| 5. | MBCH C13: Combined Practical | | |
| 6. | MBCH GE3: Swayam-III* | | |

***Generic Elective (GE) subjects are to be selected by the students from the following pool of subjects available on "Swayam", free education portal (https://swayam.gov.in/) as recommended by UGC.** Courses delivered through SWAYAM are available free of cost to the learners, however students wanting certification shall be registered, shall be offered a certificate on successful completion of the course, with a little fee. At the end of each course, there will be an assessment of the student through proctored examination and the marks/grades secured in this exam could be transferred to the academic record of the student. UGC has already issued the UGC (Credit Framework for online learning courses through SWAYAM) Regulation 2016 advising the universities to identify courses where credits can be transferred on to the academic record of the students for courses done on SWAYAM, as per the announcements on the UGC website.

** **Research Work**: Research Supervisor will be allotted to the student in Semester III. The work can be carried out on the following:

1) Stress Biology 2) Neuroscience 3) Immunology 4) Cancer Biology 5) Microbial Biochemistry 6) Biosensors 7)Bioinformatics

**SYLLABI OF CORE COURSE OF READING (Pattern of instructions for Paper Setter)**

Question papers will have FOUR sections. Examiner will set a total of Nine questions comprising TWO questions from each SECTION and ONE compulsory question of short answer types covering the whole syllabus. Students will attempt FIVE questions in all, including ONE question from each SECTION and the compulsory question. All Questions will carry equal marks, unless specified.

**THRUST AREAS:** Research in the department covers a spectrum of topics in modern Biochemistry. These are (i) Analyzing diseases at cellular and molecular level such as: Autoimmune diseases, Cancers, Central nervous system disorders, etc. (ii) Assessing natural products as therapeutics (iii) Biochemical Toxicology (iv) Biosensors in diagnostics (v) Microbial Biochemistry (vi) Stress Biochemistry using yeast model.

**PLACEMENTS:** As a scientific discipline, biochemistry lies at the interface between biology, chemistry, pharmacology & medicine. This opens up a variety of career paths such as: Bioanalyst, R & D researcher, Ph.D. programs at premier institutes of India and abroad, teacher, scientist, food & drug analyst, pharmaceutical industry, etc.

**ALUMNI RELATIONS:** The alumni network of the department is well connected and is growing stronger every year. The members are spread both nationally and internationally. Their contributions have been acknowledged by various organizations and institutions. The department organizes Alumni meet so the current students can interact with their seniors and learn from them.

## DEPARTMENT OF BIOPHYSICS

### ABOUT THE DEPARTMENT:

Biophysics has in recent times emerged as an important interdisciplinary subject in Life Science and primarily deals with the structure, bioenergetics, dynamics and function of the biomolecules. Over the years, the discipline of biophysics has played a significant role in the growth of critical areas, which include molecular biophysics, physiological biophysics, medical physics, radiation physics, gene and protein engineering, Computational Biophysics, neuro degenerative disorders and membrane biophysics. Advances in these areas have paved newer initiatives for the designing and development of drugs and medical technologies.

The Department of Biophysics was established in 1964 and ever since is the only department in the country which offers both undergraduate and postgraduate courses in the discipline of Biophysics (Hons.). The department also offers excellent research opportunities leading to the award of Ph.D. degree. The courses being offered to the three year B.Sc.(Hons.) and two year M.Sc. students in Biophysics are planned in a way, so as to provide a broad base in the subject and are accepted in the diverse fields of biomedical sciences. Alumni from this department have been always suitably employed and many of them have occupied coveted positions in the academia, industry, medical institutions, national laboratories and prestigious research institutions in India and abroad.

The department has been given special assistance grants under UGC-SAP program, Phase DSA-I from April 2015-2020. The department is also recognized under DST-FIST Programme. In addition, the Department is availing DST PURSE Grant on a regular basis. For more details see the website http://biophysics.puchd.ac.in

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professor Emeritus | G.S. Gupta | Proteomics and Cancer-Testis Antigens |
| UGC-BSR Faculty | D.K.Dhawan | Nuclear Medicine and Radiation Biophysics |
| Professors | M.L. Garg | Spectroscopic & Computational Studies of metalloproteins, Biomedical Instrumentation |
| | Ashwani Koul | Phytomedicine & Carcinogenesis |
| Assistant Professors | Avneet Saini **(Chairperson)** | Peptide Design, Structural characterization & validation |
| | Sarvnarinder Kaur | Phytomedicine & Carcinogenesis, Reproductive Biology |
| | Tanzeer Kaur | Proteomics of Pathological Calcification |
| | Pavitra Ranawat | Molecular Cell Physiology of Cancer |
| | Simran Preet | Anti-Microbial and Anti-cancer peptides |
| | Naveen Kaushal | Cell Biology & Molecular Immunology |
| UGC-FRP | Ravi Pratap Barnwal | Structural insights into protein complexes, protein RNA complexes, microRNA and noncoding (nc) RNA using solution state NMR spectroscopy |
| Inspire Faculty | Neha Singla | Neuroscience Toxicology |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Biophysics) under the Framework of Honours School System | 25 +4 NRI +1 Foreign National | 3 years | A candidate should have passed 10+2 examination with at least 50 % marks with English, Physics, Chemistry, Mathematics / Biology from recognized Board /CBSE | Based on PU-CET (UG)<br>Academics: 25%<br>PU-CET (UG): 75% |
| M.Sc. (Hons.) under the Framework of Honours School System | 25+4 NRI +1 Foreign National | 2 years | (i) B.Sc. (Hons.) Biophysics, Panjab University, Chandigarh or any other University considered equivalent.<br>(ii) Bachelor of Science in any other subject (such as B.Sc. Medical, Non-medical, Biotechnology, Bioinformatics etc.)<br>(iii) Students who have passed B.Sc. (Hons.) in Biophysics from Panjab University, Chandigarh will be directly promoted to M.Sc. in Biophysics. However, all other applicants need to qualify the CET-PG in Biophysics conducted by | Based on CET-PG<br>Academics: 40%<br>PU-CET (UG): 60% |

| | | | | |
|---|---|---|---|---|
| | | | the Panjab University, Chandigarh. | |
| Ph.D | 48 | 3-6 years | See Ph.D Prospectus 2022. | |
| *5% Concession is admissible in eligibility marks to ST/SC/BC/PwD candidates | | | | |

**TITLE OF SYLLABI:** Detailed course curriculum is available at http://puchd.ac.in/syllabus.php

**B.Sc. (Hons.) (Under CBCS system)**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| C1 | BCH-C1:Biomolecules | C3 | MIC-C3: General Microbiology |
| C2 | BPH-C2: Cell Biology | C4 | BTC-C4: Molecular Biology |
| **AECC1** | **BPH-AECC1: English** | **AECC2** | **BPH-AECC2: Environmental Science** |
| GE1* | | GE3* | |
| GE2* | | GE4* | |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| C5 | BPH-C5: Physics Of The Human Body | C8 | BPH-C8: Human Physiology and Anatomy II |
| C6 | BPH-C6: Physicochemical Techniques | C9 | BPH-C9: Biophysical Chemistry |
| **C7** | BPH-C7: Human Physiology And Anatomy I | C 10 | BPH-C 10: Radiation and Biomedical Instrumentation |
| SEC 1 | | SEC 2 | |
| GE5* | | GE6* | |
| **SEMESTER-V** | | **SEMESTER-VI** | |
| C11 | BCH-C11: Radiation Biophysics | C13 | BPH-C13: Gene And Protein Engineering |
| C12 | BPH-C12: Bioinformatics And Computational Biology | C14 | BTC-C14: Molecular Biophysics |
| DSE1 | | DSE3 | |
| DSE2 | | DSE4 | |

C: Core Courses; GE: General Elective; AECC: Ability Enhancement Compulsory Courses; SEC: Skill Enhancement Courses; DSE: Discipline Specific Elective

**ELECTIVE/GENERAL ELECTIVE:**

**GENERIC ELECTIVE SUBJECTS (Offered by Biophysics Department) for students of other departments**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| 1. | BPH-GE1A: Human Physiology and Anatomy | 1. | BPH-GE2A: Radiation Biophysics and Biomedical Instrumentation |
| 2. | BPH-GE1B: Human Physiology and Anatomy | 2. | BPH-GE2B: Radiation Biophysics and Biomedical Instrumentation |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| 1. | BPH-GE3: Bioinformatics and Computational Biology | 1. | BPH-GE4: Biophysical Techniques |

**SKILL ENHANCEMENT COURSES (any one per semester in semesters 3-4) for students of biophysics department**

| SEMESTER-III | | SEMESTER-IV | |
|---|---|---|---|
| 1. | BPH-SEC1: Biophysics: Industrial and Clinical Applications | 1. | BPH-SEC3: Sports Medicine |
| 2. | BPH-SEC2: Human Genetics and its Applications | 2. | BPH-SEC4: Soft Skills Development |

**DISCIPLINE SPECIFIC ELECTIVE COURSES (any two per semester in semesters 5-6) for students of biophysics department.**

| SEMESTER-V | | SEMESTER-VI | |
|---|---|---|---|
| 1. | BPH-DSE1: Cytology and Cell Physiology | 1. | BPH-DSE5: Neuro Biophysics |
| 2. | BPH-DSE2: Biomedical Imaging | 2. | BPH-DSE6: Gene Organization and regulation |
| 3. | BPH-DSE3: Advanced Microscopy | 3. | BPH-DSE7: Immunology |
| 4. | BPH-DSE4: Biomaterials | 4. | BPH-DSE8: Cell and Tissue culture Techniques |

**M.SC**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| **Compulsory Core Courses** | | **Compulsory Core Courses** | |
| MBPH-TH-C1 | Molecular Basis of Gene and Protein Engineering | MBPH-TH-C5 | Cell and Membrane Biophysics |
| MBPH-TH-C2 | Methods in High Throughput Biology | MBPH-TH-C6 | Medical Physics |
| MBPH-TH-C3 | Bio-molecular Spectroscopy | MBPH-TH-C7 | Programming and Statistical Data Analysis |
| MBPH-PR-C1 | Molecular Basis of Gene and Protein Engineering | MBPH-PR-C5 | Cell and Membrane Biophysics |
| MBPH-PR-C2 | Methods in High Throughput Biology | MBPH-PR-C6 | Medical Physics |

| | | | |
|---|---|---|---|
| MBPH-PR-C3 | Bio-molecular Spectroscopy | MBPH-PR-C7 | Programming and Statistical Data Analysis |
| MBPH-TH-C4 | Advanced Topics in Biophysics | MBPH-PR-C4 | Research Laboratory Rotation |

@ Discipline Elective Courses will be offered only if a minimum 7 seven students opt for it and also on the availability of the faculty

* only for students who have taken admission directly in M.Sc. Biophysics program of P.U. (without doing B.Sc. Biophysics from P.U.)

# for students who have not studied this subject in B.Sc. V or VI semester.

$ Student may opt for any **one** of the Generic Elective Courses studied in M.Sc. offered by the Science Departments (other than the Biophysics department) of Panjab University. The course must be approved by the Academic Committee of the department followed by its approval by BOC.

^^ A course under the code MBPH-MOOC1-3 can be selected from the available UGC MOOCs Courses: A Vertical of SWAYAM-Inflibnet. The course must be approved by the Academic Committee of the department followed by its approval by BOC.

** Allotment shall be on merit basis of the result of Semester I and II. Thesis must be submitted by 31st July of every academic year, failing which it shall be counted as Re-appear.

**THRUST AREAS:** Cancer Biology, Neuro-biophysics and Drug Discovery.

**PLACEMENT:** The Department of Biophysics has an active placement cell which helps, supports and encourages the students for venturing into the fields of their respective interests.

In this regard, Department organizes regular seminars and talks in collaboration with central placement cell of PU, where distinguished alumni from various fields are invited to discuss the scope of Biophysics, emphasizing on the placement scenario and opportunities in the field.

**ALUMNI RELATIONS:** Department keeps constant contact with its alumni whether in India or abroad. Whenever, they visit the department there is always an interaction with faculty and students. Prior to their visit, most of the alumni inform the department about their visit and if the alumni are active in academia/research then the dept. plans their lecture or informal interaction with the students. The alumni also help in placement of the students in academia and research. The Department holds alumni meets at regular intervals.

## DEPARTMENT OF BIOTECHNOLOGY

### ABOUT THE DEPARTMENT

The Department came into existence as Centre in 1989. In 1993 after obtaining financial aid from UGC and DBT, Govt. of India, it was upgraded to the level of full-fledged Department. The Department is rated as one of the best in India for imparting state of art technology to the students in the field of biotechnology. Most of the students qualify UGC and CSIR entrance test in their first attempt and are admitted to Ph.D. programs in prestigious research institutions in India. Most of the faculty members have been trained abroad and are recipient of prestigious National and International awards. The faculty of the department publishes research papers in National and International journals on regular basis. Every year department organizes workshop/symposium / seminar dealing with state of art technologies. Department also organizes a seminar on "Frontiers in Biotechnology" for B.Sc. and M.Sc. students on regular basis. Scientists of international repute are invited to deliver lectures. The department has the distinction of being funded by DST-FIST (2002-07; 2011-16) and UGC-SAP (2007-12; 2013-18).

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professor Emeritus | R.C. Sobti | Molecular Diagnosis of Cancer |
| Professors | Jagdeep Kaur | Enzymology/Protein Engineering, Cancer Biology |
| | Neena Capalash | Microbial Biotechnology & Cancer Biology |
| | Jagtar Singh | Immunology & Molecular Epidemiology, Animal Biotechnology |
| | Desh Deepak Singh | Bioinformatics and Structural Biology |
| Associate Professor | Kashmir Singh **(Chairperson)** | Plant Biotechnology |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Hons.) | 15 + 02 NRI + 1 Foreign National | 3 years | 50% marks in 10+2 or equivalent examination with the subjects English, Physics, Chemistry, Mathematics / Biology. | Based on PU CET (UG) P.U.CET (UG) : 75% Qualifying Exam: 25% |
| M.Sc. | Ongoing Class | 2 years | For ongoing class: Passed B.Sc. (Hons.) Biotechnology from Panjab University. | Ongoing Class |
| | 5 General + 2 SC +2 NRI | | B.Sc. Biotechnology (50% marks) / B.Sc. with 50% marks with biotechnology as elective / vocational subject (Studied for 3 years) are eligible. | Based on PU CET-(PG) Academics: 40% P.U. CET (UG): 60% |
| Ph.D. | Subject to availability | 3-6 years | See Ph.D. Prospectus 2022 | Candidates who have cleared UGC- NET /CSIR -NET) / GATE Examination / SLET/ Teacher Fellowship holders / direct awardees of fellowship by any |

| | | | | |
|---|---|---|---|---|
| | | | | national agency or any other equivalent test. Candidates who have cleared P.U. Entrance Test. |

*5% Concession is admissible in eligibility requirement to SC/ST/BC/PWD candidates.
** The candidates seeking admission in M.Sc. Biotechnology should fill separate admission forms in colleges offering M.Sc. course in Biotechnology. No Centralized Counselling will be done by the Department.

**TITLE OF SYLLABI** : Detailed course curriculum is available at http://puchd.ac.in/syllabus.php

**B.Sc. (Hons.)**

| | **Semester-I** | | **Semester - II** |
|---|---|---|---|
| Paper-1 | General Microbiology | Paper-1 | Biomolecules |
| Paper-2 | Molecular Biology | Paper-2 | Cell Biology |
| Paper-3 | English | Paper-3 | Environment Education |
| Paper-4 | Generic Elective 1 | Paper-4 | Generic Elective 2 |
| | **Semester-III** | | **Semester- IV** |
| Paper-1 | Chemistry | Paper-1 | Biochemistry and Metabolism |
| Paper-2 | Enzymology | Paper-2 | Bio Analytical Tools |
| Paper-3 | Plant Physiology | Paper-3 | Bioprocess Technology |
| Paper-4 | Skill Enhancement Course 1 | Paper-4 | Skill Enhancement Course 2 |
| Paper-5 | Generic Elective 3 | Paper-5 | Generic Elective 4 |
| | **Semester-V** | | **Semester- VI** |
| Paper-1 | Animal Biotechnology | Paper-1 | Immunology |
| Paper-2 | Recombinant Biotechnology | Paper-2 | Plant Biotechnology |
| Paper-3 | Discipline Specific Elective 1 | Paper-3 | Discipline Specific Elective 3 |
| Paper-4 | Discipline Specific Elective 2 | Paper-4 | Discipline Specific Elective 4 |

**SYLLABUS 2022-23: M.Sc. Biotechnology under CBCS (http://puchd.ac.in/syllabus.php):**

| | **Semester-I** | | **Semester - II** |
|---|---|---|---|
| Paper-1 | Animal Cell Culture Technology | Paper-1 | Bioinformatics |
| Paper-2 | Advanced Immunology | Paper-2 | Microbial Biotechnology |
| Paper-3 | Advanced Recombinant DNA Technology | Paper-3 | Entrepreneurship Development |
| Paper-4 | Advanced Molecular Biology | Paper-4 | Scientific Writing & Project Management |
| | **Semester-III** | | **Semester- IV** |
| Paper-1 | Animal Biotechnology | | Research Project<br>a) Thesis<br>b) Presentation & Viva<br>c) Internal Assessment |
| Paper-2 | Plant Biotechnology | | |
| Paper-3 | Emerging Technologies | | |
| Paper-4 | **†Electives (any one to be opted)** | | |
| | Molecular Medicine | | |
| | Food Microbiology and Food Safety | | |
| Paper-5 | Trends in Biotechnology | | |

**PH.D COURSE WORK (ONE SEMESTER):**

Research methodology, Basic & Modern Analytical Techniques in Biotechnology, Presentations.

**THRUST AREAS:**

Molecular Epidemiology, Microbial Biotechnology, Plant Biotechnology, Recombinants, Glycobiology of Infectious Diseases.

**PLACEMENTS:**

Faculty of the department provides career counseling to the students and helps them to choose profession of their choice. More than 50% PG students prefer to join Ph.D after clearing competitive exams (UGC/CSIR/DBT/ICMR NET *etc.*). Few of our students are doing Ph.D in countries like US, Canada, EU *etc*. after completing Ph.D. students are placed in teaching/research institutes and a few go abroad for Postdoctoral fellowships. The Department provides a platform to encourage the students for joining private sector in the field of biotechnology.

**ALUMNI RELATIONS:**

The Department maintain the record of pass out students and time to time invites past students to interact with present students by conducting seminars, symposia *etc.*

## DEPARTMENT OF BOTANY

**ABOUT THE DEPARTMENT**

The Department of Botany was established in 1919 at Lahore. It shifted to Chandigarh in 1960 from Khalsa College, Amritsar where it was housed temporarily after partition of the country. The Department has grown into a well recognised centre for higher learning and research in structural, functional and evolutionary aspects of plants. The department had DST-FIST programme and had completed UGC DRS-II phase. Some of the major areas of research are: taxonomy, morphology, improvement and propagation of economically important plants, ecology of invasive alien plants, physiological up-gradation of harvest index of some important crops; stress biology of legumes; identification of eco-friendly herbicides and pesticides; mushroom cultivation; evaluation and conservation of plant diversity; importance of microbes in human welfare and molecular characterization of gene families involved in development and stress responses. In addition to teaching through modern techniques, seminars, symposia, workshops, the invited lectures and botanical excursions are an integral part of academic programme. The department has a well-stocked library with nearly 6,814 books and over 60 regular scientific journals. The

department also houses an internally recognized Herbarium (abbreviated as PAN) and a Museum. The P.N. Mehra Botanical Garden, spread over 16 acres of land is one of the better-known botanical gardens attached to any university of the country. The department has been getting regular sanction for BSR fellowships under UGC-SAP (DRS-III) programme. Additionally, the UGC also sanctions funds to the department for infrastructural development from time to time. Besides this, many research projects are being funded by DST, MoEF, UGC, CSIR, DBT, SERB and MoFPI. The Department has received DST FIST Grant for a period of 5 years and RUSA Grant respectively starting from 2020.

## FACULTY

| Particulars | Name | Field of Research Specialization |
|---|---|---|
| Honorary Professor | S.S. Chahal | Plant Pathology |
| Prof. Emeritus | S.C. Verma | Cytogenetics |
| | M.L. Sharma | Angiosperm taxonomy and grasses |
| | S.S. Kumar | Bryology |
| | S.P. Khullar | Pteridophytes |
| Professors | Daizy Rani | Plant Ecology (Eco-Physiology) |
| | Harsh Nayyar | Plant Physiology |
| | P. Pathak **(Chairperson)** | Morphology and Morphogenesis |
| | C. Nirmala | Cytogenetics, Molecular Biology and Biotechnology |
| | Sunita Kapila | Bryology |
| | Richa Puri | Biosystematics & Seed Physiology |
| | Neera Garg | Plant Physiology |
| | Kamaljit Singh | Plant Physiology and Biochemistry |
| | M.C. Sidhu | Cytogenetics / Plant Breeding |
| Associate Professor | Anju Rao | Plant Morphogenesis |
| Assistant Professors | A.N.Singh | Ecology |
| | Shalinder Kaur | Eco-physiology |
| | Santosh K. Upadhyay | Plant Molecular Biology |
| | Jaspreet Kaur | Tissue Culture and Molecular Biology |
| | Papiya Mukherjee | Cryo-Biology and Molecular Biology |

## COURSES OFFERED (SEMESTER SYSTEM)

| Courses | Seats | Duration | Eligibility* | Admission criteria |
|---|---|---|---|---|
| B.Sc. (Hons.) under the framework of Honours School System | 20+3 NRI+1 Foreign National | 3 years | 10+2 examination with atleast 50% marks with Physics, Chemistry, Biology and English from recognized Board / CBSE | Based on PU-CET (UG) Academics: 25% PU-CET(UG):75% |
| M.Sc. (Botany) under the framework of Honours School System | 25+4 NRI+1 Foreign National | 2 years | B.Sc. (Hons) or (Pass or Hons.) with 50% marks from PU or any other recognized University or any other exam as equivalent thereto with Botany as one of the elective subject. | Based on PU-CET (PG) Academics: 40% PU-CET(PG):60% |
| Ph.D | 15 | 3-6 years | See Ph.D Prospectus 2022 | |
| * 5% concession is admissible in eligibility marks to SC/ST/BC/PwD candidates. | | | | |

**TITLES OF SYLLABI:** Detailed course curriculum is available at https://puchd.ac.in/syllabus.php

**B.Sc. (Honours) Semester I -VI Botany** (Under the framework of Honours School System)

| SEMESTER-I | SEMESTER-II |
|---|---|
| BOT-C1: Phycology & Microbiology | BOT-C3: Mycology & Phytopathology |
| BOT-C2: Biomolecules & Cell Biology | BOT-C4: Archegoniates |
| Practical C-1 | Practical C-3 |
| Practical C-2 | Practical C-4 |
| BOT-AECC1: English | BOT-AECC2: Environment Science |
| BOT-GE1: Biodiversity (Microbes, Algae, Fungi and Archegoniate) | BOT-GE2: Plant Anatomy and Embryology |
| Practical GE-1 | Practical GE-2 |
| **SEMESTER-III** | **SEMESTER-IV** |
| BOT-C5: Plant Anatomy | BOT-C8: Molecular Biology |
| BOT-C6: Economic Botany | BOT-C9: Plant Ecology & Phytogeography |
| BOT-C7: Basics of Genetics | BOT-C10: Plant Systematics |
| Practical C-5 | Practical C-8 |
| Practical C-6 | Practical C-9 |
| Practical C-7 | Practical C-10 |
| SEC-1: Biofertilizers | SEC-2: Medicinal Botany |
| GE-3: Economic Botany & Plant Biotechnology | GE-4: Plant Ecology and Taxonomy |
| GE-3 Practical | GE-4 Practical |
| **SEMESTER-V** | **SEMESTER-VI** |
| BOT-C11: Reproductive Biology of Angiosperms | BOT-C13: Plant Metabolism |

| | |
|---|---|
| BOT-C12: Plant Biotechnology | BOT-C14: Plant Physiology |
| Practical C-11 | Practical C-13 |
| Practical C-12 | Practical C-14 |
| DSE-1: Plant Breeding | DSE-3: Bioinformatics |
| DSE-2: Research Methodology | DSE-4: Natural Resource Management |
| DSE-4: Practical | DSE-2: Practical |
| DSE-7: Practical | DSE-5: Practical |

**M.Sc**

| **SEMESTER-I** | **SEMESTER-II** |
|---|---|
| BOT-Core-1001: Plant Physiology | BOT-Core-2001: Phycology |
| BOT-Core-1002: Principles of Ecology | BOT-Core-2002: Plant Biotechnology |
| BOT-Core-1003: Bryology | BOT-Core-2003: Mycology and Plant Pathology |
| BOT-Core-1004: Pteridology | BOT-Core-2004: Genomics |
| BOT-Core-1005: Plant Resource Utilization and Conservation | BOT-Core-2005: Cytogenetics and Plant Breeding |
| **SEMESTER-III** | **SEMESTER-IV** |
| BOT-Core-3001:: Plant Biochemistry | BOT-Core-4001: Gymnosperms |
| BOT-Core-3002:: Cell & Molecular Biology | BOT-Core-4002: Environment Botany |
| BOT-Core-3003:: Angiosperms : Phylogeny, Embryology and Taxonomy | Paper-III: Field Study |
| Paper-IV: Seminars | Paper-IV: Project Work |
| **Elective Courses (Two Courses to be selected out of four offered)** | **Elective Courses (Three Courses to be selected out of six offered)** |
| BOT-Elective-3004:: Invitro Technologies and Industrial Applications | BOT-Elective-4003: Advances in Ecology |
| BOT-Elective-3005: Urban Environment | BOT-Elective-4004: Advances in Plant Biochemistry |
| BOT-Elective-3006: Agroecology & Sustainable Agriculture | BOT-Elective-4005: Advances in Molecular Biology |
| BOT-Elective-3007: Plant Morphogenesis | BOT-Elective-4006: Microbial Technology |
| | BOT-Elective-4007: Recombinant Proteomics |
| | BOT-Elective-4008: Advanced topics in Plant Physiology |

**THRUST AREAS:** Plant Physiology, Plant Ecology, Plant Biotechnology, Plant Biochemistry, Phychology, Mycology, Bryology, Taxonomy, Physiology, Cytology.

**PLACEMENT**: The department has a Placement Cell which Co-ordinates with Central Placement Cell of the University to get time to time information about the opportunities available to the students of the Department.

**ALUMNI RELATIONS:** The Department has alumni association i*.e.,* Panjab University Botany Department Alumni Association (PUBDAA), which has Executive Committee and several members. The department organizes Alumni Meet every year to maintain contact with the alumni as well as to provide the information about the latest happenings of the department to members. Several of its alumni are highly distinguished and working in different capacities at National and International levels.

## DEPARTMENT OF CHEMISTRY

### ABOUT THE DEPARTMENT

Founded by Dr. S. S. Bhatnagar at Lahore in 1925, the Department of Chemistry is one of the prestigious Departments of Panjab University. It has on its faculty highly competent members whose work has been internationally recognized. Several faculty members are recipients of awards and honours, such as Shanti Swarup Bhatnagar, Jawaharlal Nehru Fellowship, Raman and Palit awards. Many faculty members are bestowed with F.N.A., F.A.Sc., F.N.A.Sc. The Department has been selected by the UGC first for COSIST and Special Assistance Programme (SAP) and it is the Centre of Advanced Studies in Chemistry (CAS) for the last 16 years. The Department of Science and Technology (DST), Government of India has accorded it the status of "DST-FIST Supported Department". The Department has stimulating undergraduate and postgraduate teaching programmes. Frequent symposia, conferences, invited lectures and refresher courses have been organized for the benefit of University, College and School teachers and talented students. The Department has good instrumental facilities and its library is perhaps one of the best in Northern India with its excellent collection of books, research journals and monographs. The Department is well-known for its research activities and has very well equipped research Laboratories**.**

### FACULTY

| **Particular** | **Name** | **Field of Research Specialization** |
|---|---|---|
| Honorary Professor | T. Ramasami | |
| Professors Emeritus | S. V. Kessar | Organic |
| | Gurdev Singh | Inorganic |
| | D. S. Gill | Analytical |
| NASI-Senior Scientist | K. K. Bhasin | Inorganic |
| Professors | S. K. Mehta | Physical |
| | P. Venugopalan | Inorganic/Analytical |
| | Alok Srivastava | Physical |
| | Kamal Nain Singh | Organic |
| | Sonal Singhal | Inorganic |
| | **(Chairperson)** | |
| | Ganga Ram Chaudhary | Physical |

| | | |
|---|---|---|
| | Navneet Kaur | Organic |
| | Gurjaspreet Singh | Inorganic |
| | Vikas | Physical |
| Associate Professors | Neetu Goel | Physical |
| | Amarjit Kaur | Organic |
| | Navneet Kaur | Organic |
| Assistant Professors | Aman Bhalla | Organic |
| | Varinder Kaur | Inorganic |
| | Shweta Rana | Physical |
| | Rohit Kumar Sharma | Organic |
| | Ramesh Kataria | Inorganic |
| | Subash Chandra Sahoo | Inorganic |
| | Gurpreet Kaur | Physical |
| | Savita Chaudhary | Physical |
| | Deepak B. Salunke | Organic |
| | Palani Natarajan | Inorganic |
| | Jyoti Agarwal | Organic |
| UGC Assistant Professors (FRP) | Purshotam Sharma | Physical |
| | Ankur Ganesh Pandey | Organic |
| | Abhijit Dan | Physical |
| | Vijay Pal Singh | Inorganic |
| Assistant Professors (Inspire Faculty) | Girijesh Kumar | Inorganic |
| | Vaneet Saini | Organic |
| Assistant Professor (Temporary Faculty) | Khushwinder Kaur | Physical |

## COURSES OFFERED (SEMESTER SYSTEM)

| Courses | Seats | Course | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Hons.) under the framework of Honours School System | 58 + 8 NRI + 3 Foreign National | 3 years | Passed 10+2 examination from recognized Board/ CBSE with at least 50% marks with Physics, Chemistry, Mathematics/ Biology and English. | Based on PU-CET (UG) Academics: 25% PU-CET(UG): 75% |
| M.Sc.(Chemistry) under the framework of Honours School System | Ongoing students | 2 years | Passed B.Sc. (Hons.) in Chemistry from Department of Chemistry, P.U. | ---------- |
| | 15+2 NRI+1 Foreign National | | (ii) B.Sc. (Pass or Hons.) examination with 50% marks from PU or any other University recognized as equivalent thereto with Chemistry in all the three years / six semesters, and any two science subjects during two years/four semesters during graduation. (iii) B.Sc. (Hons.) in any subject under Choice-based Credit System with 24 Credits in Chemistry as Generic Elective Subject. | Based on PU-CET (PG) Academics: 40% PU-CET(PG): 60% |
| Ph.D. | | 3-6 years | See Ph.D. Prospectus -2022 | |
| *5% concession is admissible in eligibility marks to SC/ST/BC/PwD candidates. | | | | |

**TITLE OF SYLLABI:** Detailed course curriculum is available at **http://puchd.ac.in/syllabus.php?qstrfacid=10**

## B.Sc (Hons.)

**Semester I**
**CORE COURSE (CHEMISTRY)**

**Theory Papers:**

| | | |
|---|---|---|
| Core Course-1 (C 1): | Inorganic Chemistry-I | 100 Marks (4 credits) |
| Core Course-2 (C 2): | Physical Chemistry-I | 100 Marks (4 credits) |

**Practicals:**

| | | |
|---|---|---|
| Core Course-1 Practical (C 1 Lab): | Inorganic Chemistry-I | 50 Marks (2 credits) |
| Core Course-2 Practical (C 2 Lab): | Physical Chemistry-I | 50 Marks (2 credits) |

**GENERIC ELECTIVE (GE) FOR CHEMISTRY STUDENTS**

Each student of Chemistry Department has to opt two Generic Elective Courses from the available options offered by different science, mathematics, computer science and economics departments. However, a student can take only one GE course from one department per semester.

**ABILITY ENHANCEMENT COMPULSORY COURSE FOR CHEMISTRY STUDENTS**

Each student of Chemistry Department has to opt one Ability Enhancement Compulsory Course of the following:

1. English Communication (2 credits)
2. Environmental Science (2 credits)

**GENERIC ELECTIVE (CHEMISTRY)**

**Theory Papers:**

A student from other disciplines may opt one of the generic electives offered by the Chemistry Departments of Panjab University out of following:

| | | |
|---|---|---|
| Generic Elective (GE-1A) | Atomic structure, bonding, general organic chemistry & aliphatic hydrocarbons | 100 Marks (4 credits) |
| Generic Elective (GE-1B) | | 100 Marks (4 credits) |

**Practicals:**

| | |
|---|---|
| Generic Elective (GE-1A) | 50 Marks (2 credits) |
| Generic Elective (GE-1B) | 50 Marks (2 credits) |

**Semester-II**

**CORE COURSE (CHEMISTRY)**

**Theory Papers:**

| | | |
|---|---|---|
| Core Course-3 (C 3): | Organic Chemistry-I | 100 Marks (4 credits) |
| Core Course-4 (C 4): | Physical Chemistry-II | 100 Marks (4 credits) |

**Practicals:**

| | | |
|---|---|---|
| Core Course-3 Practical (C 3 Lab): | Organic Chemistry-I | 50 Marks (2 credits) |
| Core Course-2 Practical (C 4 Lab): | Physical Chemistry-II | 50 Marks (2 credits) |

**GENERIC ELECTIVE (GE) FOR CHEMISTRY STUDENTS**

Each student of Chemistry Department has to opt two Generic Elective Courses from the available options offered by different science, mathematics, computer science and economics departments. However, a student can take only one GE course from one department per semester.

**ABILITY ENHANCEMENT COMPULSORY COURSE FOR CHEMISTRY STUDENTS**

Each student of Chemistry Department has to opt one Ability Enhancement Compulsory Course of the following:

1. English Communication (2 credits)
2. Environmental Science (2 credits)

**GENERIC ELECTIVE (CHEMISTRY)**

**Theory Papers:**

A student from other disciplines may opt one of the generic electives offered by the Chemistry Departments of Panjab University out of following:

| | | |
|---|---|---|
| Generic Elective (GE-2A) | Chemistry of Main Group Elements & functional organic chemistry | 100 Marks (4 credits) |
| Generic Elective (GE-2B) | | 100 Marks (4 credits) |

**Practicals:**

| | |
|---|---|
| Generic Elective (GE-2A) | 50 Marks (2 credits) |
| Generic Elective (GE-2B) | 50 Marks (2 credits) |

**Semester III**

**CORE COURSE (CHEMISTRY)**

**Theory Papers:**

| | | |
|---|---|---|
| Core Course-5 (C 5): | Inorganic Chemistry-II | 100 Marks (4 credits) |
| Core Course-6 (C 6): | Organic Chemistry-II | 100 Marks (4 credits) |
| Core Course-7 (C 7): | Physical Chemistry-III | 100 Marks (4 credits) |

**Practicals:**

| | | |
|---|---|---|
| Core Course-5 Practical (C 5 Lab): | Inorganic Chemistry-II | 50 Marks (2 credits) |
| Core Course-6 Practical (C 6 Lab): | Organic Chemistry-II | 50 Marks (2 credits) |
| Core Course-7 Practical (C 7 Lab): | Physical Chemistry-III | 50 Marks (2 credits) |

**SKILL ENHANCEMENT COURSES**

Each student of Chemistry Department has to opt one Skill Enhancement Compulsory Course of the following:

| | | |
|---|---|---|
| 1. | CHE-SEC1: Industrial Chemistry of Fuels | 50 Marks (2 credits) |
| 2. | CHE-SEC2: Basic Analytical Chemistry | 50 Marks (2 credits) |
| 3. | CHE-SEC3: Pesticide Chemistry | 50 Marks (2 credits) |

**GENERIC ELECTIVE (GE) FOR CHEMISTRY STUDENTS**

Each student of Chemistry Department has to opt one Generic Elective Course from the available options offered by different science, mathematics, computer science and economics departments. However, a student can take only one GE course from one department per semester.

**GENERIC ELECTIVE (CHEMISTRY)**

**Theory Papers:**

A student from other disciplines may opt following generic elective offered by the Chemistry Departments of Panjab University out of:

| | | |
|---|---|---|
| Generic Elective (GE-3) | Chemical Energetics, Equilibria and Transition Metal & Coordination Chemistry, Theories of Acids & Bases | 100 Marks (4 credits) |

**Practicals:**

| | |
|---|---|
| Generic Elective - Practical (GE-3 Lab) | 50 Marks (2 credits) |

**Semester IV**

**CORE COURSE (CHEMISTRY)**

**Theory Papers:**

| | | |
|---|---|---|
| Core Course-8 (C 8): | Inorganic Chemistry-III | 100 Marks (4 credits) |
| Core Course-9 (C 9): | Organic Chemistry-III | 100 Marks (4 credits) |
| Core Course-10 (C 10): | Physical Chemistry-IV | 100 Marks (4 credits) |

**Practicals:**

| | | |
|---|---|---|
| Core Course-8 Practical (C 8 Lab): | Inorganic Chemistry-III | 50 Marks (2 credits) |
| Core Course-9 Practical (C 9 Lab): | Organic Chemistry-III | 50 Marks (2 credits) |
| Core Course-10 Practical (C 10 Lab): | Physical Chemistry-IV | 50 Marks (2 credits) |

**SKILL ENHANCEMENT COURSES**

Each student of Chemistry Department has to opt one Skill Enhancement Compulsory Course of the following:

| | | |
|---|---|---|
| 1. | CHE-SEC4: Pharmaceutical Chemistry | 50 Marks (2 credits) |
| 2. | CHE-SEC5: Chemical Technology & Society | 50 Marks (2 credits) |
| 3. | CHE-SEC6: Chemistry of Cosmetics and Perfumes | 50 Marks (2 credits) |

**GENERIC ELECTIVE (GE) FOR CHEMISTRY STUDENTS**

Each student of Chemistry Department has to opt one Generic Elective Course from the available options offered by different science, mathematics, computer science and economics departments. However, a student can take only one GE course from one department per semester.

**GENERIC ELECTIVE (CHEMISTRY)**

**Theory Papers:**

A student from other disciplines may opt following generic elective offered by the Chemistry Departments of Panjab University out of:

| | | |
|---|---|---|
| Generic Elective (GE-4) | Molecules of life, Spectroscopy, states of matter & chemical kinetics | 100 Marks (4 credits) |

**Practicals:**

| | |
|---|---|
| Generic Elective -Practical (GE-4 Lab) | 50 Marks (2 credits) |

**SEMESTER-V**

**CORE COURSE (CHEMISTRY)**

| **Theory Papers:** | | |
|---|---|---|
| Core Course-11 (C 11): | Organic Chemistry-IV | 100 Marks (4 credits) |
| Core Course-12 (C 12): | Physical Chemistry-V | 100 Marks (4 credits) |

| **Practicals:** | | |
|---|---|---|
| Core Course-11 Practical (C 11 Lab): | Organic Chemistry-IV | 50 Marks (2 credits) |
| Core Course-12 Practical (C 12 Lab): | Physical Chemistry-V | 50 Marks (2 credits) |

**DISCIPLINE SPECIFIC ELECTIVE COURSES**

Each student of Chemistry Department has to opt for two Discipline Specific Elective Courses of the following:

| **Theory Papers:** | | |
|---|---|---|
| CHE-DSE1: | Green Chemistry | 100 Marks (4 credits) |
| CHE-DSE2: | Analytical Methods in Chemistry | 100 Marks (4 credits) |
| CHE-DSE3: | Inorganic Materials of Industrial Importance | 100 Marks (4 credits) |
| CHE-DSE4: | Polymer Chemistry | 100 Marks (4 credits) |
| **Practicals:** | | |
| CHE-DSE1: | Green Chemistry | 50 Marks (2 credits) |
| CHE-DSE2: | Analytical Methods in Chemistry | 50 Marks (2 credits) |
| CHE-DSE3: | Inorganic Materials of Industrial Importance | 50 Marks (2 credits) |
| CHE-DSE4: | Polymer Chemistry | 50 Marks (2 credits) |

**SEMESTER-VI**

**CORE COURSE (CHEMISTRY)**

| **Theory Papers:** | | |
|---|---|---|
| Core Course-13 (C 13): | Inorganic Chemistry-IV | 100 Marks (4 credits) |
| Core Course-14 (C 14): | Organic Chemistry-V | 100 Marks (4 credits) |
| **Practicals :** | | |
| Core Course-13 Practical (C 13 Lab): | Inorganic Chemistry-IV | 50 Marks (2 credits) |
| Core Course-14 Practical (C 14 Lab): | Organic Chemistry-V | 50 Marks (2 credits) |

**DISCIPLINE SPECIFIC ELECTIVE COURSES**

Each student of Chemistry Department has to opt for two Discipline Specific Elective Courses of the following:

| | | |
|---|---|---|
| **Theory Papers:** | | |
| CHE-DSE5: | Applications of Computers in Chemistry | 100 Marks (4 credits) |
| CHE-DSE6: | Colloidal Chemistry | 100 Marks (4 credits) |
| CHE-DSE7: | Strategies in Organic Synthesis | 100 Marks (4 credits) |
| CHE-DSE8: | Properties of Coordination Compounds & Group Theory | 100 Marks (4 credits) |
| **Practicals:** | | |
| CHE-DSE5: | Applications of Computers in Chemistry | 50 Marks (2 credits) |
| CHE-DSE6: | Colloidal Chemistry | 50 Marks (2 credits) |
| CHE-DSE7: | Strategies in Organic Synthesis | 50 Marks (2credits) |
| CHE-DSE8: | Properties of Coordination Compounds & Group Theory | 50 Marks (2 credits) |

**M.Sc. (Chemistry) Semester-I (Marks: 500)**

| Parent Department (Core Courses) | | | | |
|---|---|---|---|---|
| **Paper** | **Title** | **Max. Marks** | **Con. Hours** | **Total Credits** |
| Core 1 | Group Theory and X-ray Crystallography | 100 | 4 | 4 |
| Core 2 | Organic Synthesis | 100 | 4 | 4 |
| Core 3 | Quantum Chemistry | 100 | 4 | 4 |
| Core 4 | Organic Spectroscopy | 100 | 4 | 4 |
| Core 5 | Advanced Practicals | 100 | 6 | 4 |

*Total credits: 20*

**M.Sc. (Chemistry) Semester-II (Marks: 500)**

| Parent Department (Core Courses) | | | | |
|---|---|---|---|---|
| **Paper** | **Title** | **Max. Marks** | **Con. Hours** | **Total Credits** |
| Core 6 | Transition Metal Chemistry | 100 | 4 | 4 |
| Core 7 | Pericyclic and Asymmetric Synthesis | 100 | 4 | 4 |
| Core 8 | Colloids, Surfaces and Macromolecules | 100 | 4 | 4 |
| Core 9 | Inorganic Spectroscopy and Nuclear Chemistry | 100 | 4 | 4 |
| Core 10 | Computer Practical & Computational Chemistry | 100 | 6 | 4 |
| *Total credits: 20* | | | | |

**M.Sc. (Chemistry) Semester-III (Marks: 500)**

| Parent Department (Core courses) | | | | |
|---|---|---|---|---|
| **Paper** | **Title** | **Max. Marks** | **Con. Hours** | **Total Credits** |
| Core 11 | Bioinorganic Chemistry | 100 | 4 | 4 |
| Core 12 | Chemistry of Natural Products | 100 | 4 | 4 |
| Core 13 | Advanced Statistical Thermodynamics and Molecular reaction dynamics | 100 | 4 | 4 |
| Elective 1 and 2 | Research Project Work (Departmental Elective) (including CBT) | 200 | 24 | 8 |
| *Total credits: 20* | | | | |

**M.Sc. (Chemistry) Semester-IV (Marks: 500)**

| **Parent Department** | | | | |
|---|---|---|---|---|
| **Paper** | **Title** | **Max. Marks** | **Con. Hours** | **Total Credits** |
| Core 14 | Cages and Clusters | 100 | 4 | 4 |
| Core 15 | Bio-organic Chemistry and Organic Macromolecules | 100 | 4 | 4 |
| Core 16 | Electrochemistry and Materials Chemistry | 100 | 4 | 4 |
| Elective 3 and 4 | Research Project Work (Departmental Elective) | 200 | 24 | 8 |
| *Total credits: 20* | | | | |

**THRUST AREAS:** Synthetic Chemistry (Both Inorganic and Organic), Heterocyclic, Natural Products and Green Chemistry, Nanotechnology and Nuclear Chemistry, Colloidal, Biophysical, Theoretical and Computational Chemistry.

**PLACEMENT:** Many Post-graduate students pursue career in teaching and research after qualifying CSIR/UGC National Eligibility Test (NET). Our Students are absorbed for job/research in premier institutions like IISc, TIFR, BARC, DRDO, ISRO, IMSC, IIT, NCL, NPL and IISER. GATE/GRE qualified students get avenues for professional studies in India/Abroad. Some graduate students go for Post- graduate studies at TIFR, IISc, IMSc, IITs and various Central Universities. Students also find jobs through PU Central Placement Cell besides the Placement Cell of the department.

**ALUMNI RELATIONS:** Chemistry department has produced many distinguished alumni, who have adored both administrative / executive and scientific positions in our country and abroad. The department has an association named "Chemistry Department Alumni Association, Panjab University (CDAAPU). Annual meeting of the alumni is a regular feature. Executive members of the alumni association meet frequently to discuss the activities of the association. CDAAPU provides fellowships to needy students out of the interest accrued from contribution of alumni of 1968 batch.

# DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

## ABOUT THE DEPARTMENT

The Department of Computer Science and Applications was set up as a Centre in 1983. It got the status of the Department of Computer Science and Applications in 1997. The department offers various professional educational programmes like Ph.D. programme, Master of Computer Applications (MCA – Morning) a three-year full time course, MCA (Self Financing) – a 3-year full time self-financing course and M. Sc. Computer Science under the framework of Honours School System. For these Post Graduate degree courses, admissions are held through an entrance test conducted by the Panjab University. The quality of input is really good as both Indian as well as foreign students are attracted towards these programmes.

The department has qualified, regular and competent faculty members with Ph.D./ M.Tech / MCA (UGC NET) qualifications. Being a professional course, the curriculum is revised regularly to keep abreast of the latest advancements in the industry as well as the academia. Almost all the students at DCSA are well placed in various reputed companies. The department has an excellent infrastructure including laboratories, library, Internet facility, wireless networks and teaching – learning aids like smart classrooms. The faculty is performing and guiding research in different areas of Computer Science and Applications.

## FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professor (re-employed) | M. Syamala Devi | Distributed Artificial Intelligence, Image Processing, Educational Technology |
| Professors | Ravinder Kumar Singla | Software Engineering, Web Semantics, Computer Network / Security |
| | Indu Chhabra | Neural Networks, Image Processing, Data Mining, Software Engineering |
| | Sonal Chawla | Semantic Web Applications, Programming Languages, Advanced Databases, Operating System |
| | Anu Gupta | Software Engineering, Open Source Software, Cloud Computing, Java Programming |
| Assistant Professors | Jasleen Kaur Bains | Java Programming, Image Processing, Pattern Recognition |
| | Rohini Sharma **(Chairperson)** | Network Security, Design and Analysis of Algorithms |
| | Balwinder Kaur | RDBMS, Software Engineering, Operating System, Data Warehouse and Data Mining, Computer Organization |
| | Anuj Kumar | Image Processing, Pattern Recognition, Open Source Software |
| | Anuj Sharma | Pattern Recognition, Machine Learning |
| | Kavita Taneja | Mobile Ad Hoc Networks, Web Information Computing, Database Management System |
| | Supreet Kaur Mann | Wireless Sensor Networks, Networking |

## COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility | Admission Criteria |
|---|---|---|---|---|
| M. Sc. Computer Science under the framework of Honours School System | 11+2 NRI +1 Foreign National | 2 years | BCA / B.Sc.(Hons.) Computer Science / B.Tech. / B.E. (Computer Science/ Engineering) or any other examination recognized as equivalent with 50% marks(**) thereto.<br>Candidates who have studied computer science as one of the subject for three years are not eligible (for example, B.Sc with Physics, Mathematics and Computer Science / Applications) | Based on P.U. CET- (P.G.)<br>Academics: 40%<br>PU-CET(PG): 60% |
| M.C.A. | 34+ 2*+5 NRI +2 Foreign National | 2 years | The minimum qualification for admission to the first year of the course is:<br>i. A recognized first degree of minimum three years duration in any discipline with at least 50% marks(**) and with Mathematics at 10+2 or at graduation level (all three years)<br>OR | Based on P.U. CET- (P.G.) |
| M.C.A. (Evening) Self-financing | 46 + 2*+6 NRI +2 Foreign National | 2 years | ii. B.C.A. from Panjab University with 50% marks(**)<br>OR<br>iii. B.Voc (Software Development), B.Voc (Hardware and Networking) & B.Voc Multimedia (Graphics & Animation) with at least 50% marks (**) and with mathematics at 10+2 level<br>OR<br>iv. Any examination recognized by the Panjab University Chandigarh as equivalent to any of the above examination (i), (ii) or (iii) | |
| Ph.D. | Subject to availability | 3-6 years | See Ph.D prospectus 2022 | |

**5% Concession is admissible in eligibility requirement to SC/ST/BC/PwD candidates.
*for candidates who have studied Computer Science as one of the subjects for three years as a full course at the Under Graduate level.

**TITLE OF SYLLABI:** Detailed Syllabi available at http://puchd.ac.in/syllabus.php

**M.C.A.**

| SEMESTER - I | | SEMESTER - II | |
|---|---|---|---|
| CS-210 | Data and File Structure using C | CS-2115 | Object Oriented Programming (Through C++ and Java) |
| CS-2111 | Computer Organization and Architecture | CS-2116 | Computer Network and Security |
| CS-2112 | Mathematical Structures and Numerical Techniques | CS-2117 | Software Engineering and Project Management |
| CS-2113 | Relational Data Base Management System | CS-2118 | Web Technologies and Python Programming |
| CS-2114 | Operating Systems | CS-2119 | Analysis and Design of Algorithms |
| **SEMESTER - III** | | **SEMESTER - IV** | |
| CS-2120 | Interactive Computer Graphics | CS-2125 | **PROJECT WORK** |
| CS-2121 | Theory of Computations | | The Project period will be of 16 to 20 weeks duration. The Project will involve development of application / system software in industries, commercial or scientific environment. It will carry 400 marks. |
| CS-2122 | Advance JAVA and Network Programming | | |
| CS-2123 | Mobile Communication and Application Development | | |
| CS-2124 | Artificial Intelligence and Soft Computing. | | |

**M. Sc. Computer Science under the framework of Honours School System**

| | SEMESTER - I | | SEMESTER – II |
|---|---|---|---|
| MCS-1901 | Software Engineering | MCS-1906 | Advance Java and Network Programming |
| MCS-1902 | Data Base Management System | MCS-1907 | Artificial Intelligence (Using LISP) |
| MCS-1903 | Operating Systems | MCS-1908 | Interactive Computer Graphics |
| MCS-1904 | Analysis and Design of Algorithms | MCS-1921 | Theory of Computations. |
| MCS-1905 | Practical based on MCS-1902 and 1904 | MCS-1910 | Practical based on MCS-1906 and 1908 |
| | **SEMESTER - III** | | **SEMESTER – IV** |
| MCS-1911 | Soft Computing Techniques using Neural Networks | MCS-1917 | Major Project (SRS, DFD, Database Design, Input/output Design, Coding, Testing & Deployment) |
| MCS-1912 | Software Project Management | MCS-1918 | Seminar (Based on MCS-1917) |
| MCS-1913 | ASP.NET Using C# | | |
| MCS-1914 | Computer Based Optimization Techniques | | |
| MCS-1915 | Practical based on MCS-1911 | | |
| MCS-1916 | Practical based on MCS-1913 | | |

**THRUST AREAS**: Distributed Artificial Intelligence, Educational Technologies, Computer Graphics, Semantic Web Applications, Software Engineering, Open Source Software, Pattern Recognition, Image Processing and Computer Network / Security.

**PLACEMENT:** Campus placements of MCA and M. Sc. Computer Science under the framework of Honours School System students have been very good for the last many years evidencing that the MCA/ M. Sc. Computer Science under the framework of Honours School System Curriculum, teaching infrastructure and its environment have been of great importance to the students and highly relevant to the Industry. Various reputed computer companies such as Infosys, Nagarro, and Emerson etc visit the department on a regular basis for placement and more than 80% students get placed in these companies, thereby helping in development of Human Resource in the field of ICT.

**ALUMNI RELATIONS**: A large number of our Alumni are holding key positions in industry, commerce and public life in India as well as abroad.

## DEPARTMENT OF ENVIRONMENT STUDIES

### ABOUT THE DEPARTMENT

In addition to teaching, research on current environmental issues of local, national and global importance remains the major thrust areas of the Department of Environment Studies. The department also undertakes consultancy on environmental related issues through the University. The research conducted by the department has been credited with various national and international awards. The department also serves as the nucleus for co-ordination and implementation of compulsory course on Environment Education for Under Graduate classes of Panjab University and its affiliated colleges. The department has suitably developed the laboratory facilities with many sophisticated analytical equipment's including UV-VIS Spectrophotometer, HPLC (High Performance Liquid Chromatography) Flame Photometer, COD-BOD assembly for teaching, demonstration and research purposes. The department has a well-equipped a Library with latest books and reading material in the field of Environment. The classrooms are equipped with LED Projector for teaching and imparting instructions to the students. Students are encouraged to use these aids for their seminars/project presentations. The students are regularly exposed to various aspects of industry requiring environmental attention, along with educational trips to the related production units and research institutions.

### FACULTY

| **Designation** | **Name** | **Field of Research Specialization** |
|---|---|---|
| Professor | Harminder Pal Singh | Biotic Environment |
| Associate Professor | Suman Mor **(Chairperson)** | Environment, Sanitation, Health |
| Assistant Professors | Madhuri Rishi | Geo Environment |

| | | |
|---|---|---|
| | Rajeev Kumar | Physical Environment |

**COURSES OFFERED (SEMESTER SYSTEM)**

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| M.Sc. | 20+3 NRI + 1 Foreign National | 2 Year | Bachelor's Degree with minimum 50% marks in aggregate from any Science/ Engineering Stream or any other stream with Honours in Geography as one of the subjects from P.U. or any other recognised University. | Based on PUCET (PG) Academics: 50% P.U.CET (PG):50% |
| Ph.D | Subject to availability | 3-6 Years | See Ph.D. prospectus 2022 | |
| *5% concession is admissible in eligibility marks to SC/ST/BC/PWD Candidates | | | | |

**TITLE OF SYLLABI:** Detailed syllabi available at http://puchd.ac.in/syllabus.php

**M.Sc.**

| Semester -I | | | Semester -II | | |
|---|---|---|---|---|---|
| **Paper-1** | ENV-6101 | Environment Geoscience | **Paper-1** | ENV-6201 | Biodiversity and Conservation |
| **Paper-2** | ENV-6102 | Ecological Principals | **Paper-2** | ENV-6202 | Environmental Analysis: Techniques and Instrumentation |
| **Paper-3** | ENV-6103 | Environmental chemistry& Toxicology | **Paper-3** | ENV-6203 | Environmental Pollution |
| **Paper-4** | ENV-6104 | Solid waste management and techniques | **Paper-4** | ENV-6204 | Environment Awareness, Impact Assessment and Auditing |
| **Semester -III** | | | **Semester -IV** | | |
| **Paper-1** | ENV-6301 | Environmental Technology | **Paper-1** | ENV-6401 | Statistical applications and Research Methodology |
| **Paper-2** | ENV-6302 | Major Environmental Issues | **Paper-2** | ENV-6402 | Environmental Biotechnology |
| **Paper-3** | ENV-6303 | Environment and Energy Management | **Paper-3** | ENV-6403 | Remote Sensing and GIS in Environmental Studies |
| **Paper-4** | ENV-6304 | Industrial and Biomedical Waste Management | **Paper-4** | ENV-6404 | Training of at least 4-6 weeks, project report presentation |

**THRUST AREAS:** Environment Pollution Monitoring & Remediation; Assessment of Biodiversity with special reference to Invasive Plants; Bio-prospecting of Medical and Aromatic Plants; Evaluation of Natural Plant Products as Novel Agrochemicals; Eco-toxicological Impacts of Heavy metals; Rain Water Harvesting and Groundwater Pollution; Management of Solid Waste; Wastewater treatment.

**PLACEMENTS:** The pass outs from the department are well placed in various Educational / Research Institutions and Industrial Establishments.

**ALUMNI RELATIONS:** The department has recently constituted an association of the alumni. The department envisages holding at least one Alumni meet every year so as to strengthen the linkage and bondage of the Alumni and the Department

## DEPARTMENT OF GEOLOGY

### ABOUT THE DEPARTMENT

Established in 1958 by Late M.R. Sahni, the department was upgraded to the status of Centre of Advanced Study in 1963-64 in Himalayan Geology and Palaeontology. In 1986, it received COSIST Grants for improvement in infrastructure facilities in the Thrust areas of Geochemistry and Exploration Geology. In recent years of research and teaching besides Palaeontology, Petrology, Environmental Geology and Hydrogeology were included as additional thrust areas. The Department has been allocated Rs.90.00 lacs under the FIST Programme of the DST in 2003. In 2012, the department has received Rs.148.00 lacs under CAS (Phase-VII) scheme of the UGC. It is thus the oldest Advanced Centre in the Country under the Special Assistance Programme of the UGC. The Department has a large collection of fossils, rocks and minerals housedin its Museum. The department has 48 (Forty eight) (registered/enrolled)research students on its rolls.

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Honorary Professor | O.N. Bhargava | Himalayan Geology |
| Professors Emeritus | Ashok Sahni | Vertebrate Palaeontology & Biomineralisation |
| Professors | Rajeev Patnaik | Vertebrate Palaeontology |
| | Naveen Chaudhri | Igneous Petrology & Isotope Geochemistry |
| | Ashu Khosla **(Chairperson)** | Palaeontology, Vertebrate, Micropalaeontology, Sedimentology & Palaeobiogeography |
| | Parampreet Kaur | Petrology, Isotope Geochemistry & Geochronology |
| Associate Professor | Gurmeet Kaur | Petrology, Mineralogy, Geochemistry & Hydrogeo Chemistry |
| Assistant Professors | B.P. Singh | Palaeontology & Stratigraphy |
| | Seema Singh | Sedimentology & Applied Geology |
| | Mahesh Thakur | Geophysics |
| | Debabrata Das | Groundwater Hydrology |
| UGC Assistant Professor | Susanta Paikaray | Environmental Geochemistry |

**COURSES OFFERED (SEMESTER SYSTEM)**

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Hons.) under the framework of Honours School System | 30+4 NRI + 2 Foreign National | 3 Years | Candidate should have passed 10+2 examination with at least 50% marks with English, Physics, Chemistry, Maths / Biology. | Admission based on PUCET (UG) Academics : 25% P.U.CET(UG) : 75% |
| M.Sc. (Hons.) under the framework of Honours School System | 30+4 NRI+ 2 Foreign National | 2 Years | For vacant seats, B.Sc. 3 years course with Geology as one of the subjects with 50% marks in B.Sc. & 50% marks in subject of Geology in B.Sc. | B.Sc. (Hons.) students of Geology, P.U., For vacant seats P.U. CET (PG). Academics : 40% P.U. CET (PG) : 60% |
| Ph.D. | Subject to availability | 3-6 Years | See Ph.D Prospectus 2022. | |
| *5% Concession is admissible in eligibility marks to SC/ST/BC/PwD candidates. | | | | |

**TITLE OF SYLLABI :** Detailed syllabi available at http://puchd.ac.in/syllabus.php

**B.Sc. (Hons.)**

| SEMESTER-I | SEMESTER-II |
|---|---|
| **Theory Papers:** Core Course(C) | **Theory Papers:** Core Course (C) |
| Th.I: Earth System Science | Th.I: Elements of Geochemistry |
| Th.II: Mineral Science | Th.II: Structural Geology |
| **Practicals:** Core Course(C) | **Practicals:** Core Course (C) |
| Pr.I: Earth System Science | Pr.I: Elements of Geochemistry |
| Pr.II: Mineral Science | Pr.II: Structural Geology |
| **Theory Papers:** Generic Elective(GE) | **Theory Papers:** Generic Elective(GE) |
| Th.I: Essentials of Geology | Th.I: Minerals and Rocks |
| **Practicals:** Generic Elective (GE) | **Practicals:** Generic Elective (GE) |
| Pr.I: Essentials of Geology | Pr.I: Minerals and Rocks |
| **SEMESTER-III** | **SEMESTER-IV** |
| **Theory Papers:** Core Course (C) & Skill Enhancement Course (SEC) | **Theory Papers:** Core Course (C) & Skill Enhancement Course(SEC) |
| Th.I: Igneous Petrology | Th.I: Metamorphic Petrology |
| Th.II: Sedimentary Petrology | Th.II: Stratigraphic Principles &Indian stratigraphy |
| Th.III: Palaeontology | Th.III: Hydrogeology |
| **Practicals:** Core Course (C) & Skill Enhancement Course(SEC) | **Practicals:** Core Course (C) & Skill Enhancement Course (SEC) |
| Pr.I: Igneous Petrology | Pr.I: Metamorphic Petrology |
| Pr.II: Sedimentary Petrology | Pr.II: Stratigraphic Principles &Indian stratigraphy |
| Pr.III: Palaeontology | P.III: Hydrogeology |
| **SEI: 1** | **SEI: 2** |
| Core Course (C) & Skill Enhancement Course (SEC1) Field Geology-1 / course work introduced UNDER RUSA | Core Course (C) & Skill Enhancement Course (SEC2) Field Geology 2/3/4/5 course work introduced UNDER RUSA |
| **SEMESTER-V** | **SEMESTER-VI** |
| **Theory Papers:** Core Course (C) | **Theory Papers:** Core Course (C) |
| Th.I: Economic Geology | Th. I: Engineering Geology |
| Th.II: Geomorphology | Th.II: Remote Sensing & GIS |
| **Practicals:** Core Course (C) | **Practicals:** Core Course (C) |
| Th.I: Economic Geology | Pr. I: Engineering Geology |
| Th.II: Geomorphology | Pr.II: Remote Sensing & GIS |
| **Theory Papers:** Discipline Specific Elective (DSE) | **Theory Papers:** Discipline Specific Elective (DSE) |
| Th.I: Geophysics | Th. I: Evolution of Life Through Time |
| Th.II: Earth's Climate and Environment | Th. II: Fuel Geology |
| **Practicals:** Discipline Specific Elective (DSE) | **Practicals:** Discipline Specific Elective (DSE) |
| Th.I: Geophysics | Pr. I: Evolution of Life Through Time |
| Th.II: Earth's Climate and Environment | Pr. II: Fuel Geology |

**B.Sc. (Hons.) III & IV Semester Generic Elective (GE) in Geology (Theory & Practical)**

| SEMESTER-III | | SEMESTER-IV | |
|---|---|---|---|
| Th.I: | Ground Water | Th. I: | Stratigraphy |
| Pr.I: | Ground Water | Pr. I: | Stratigraphy |

**M.Sc**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| **Theory Papers : Core Course (CM)** | | **Theory Papers : Core Course (CM)** | |
| Th.I | Micropalaeontology | Th.I | Vertebrate Diversity & Evolution |
| Th.II | Neotectonics & Earthquakes | Th.II | Sedimentology |

| | | | |
|---|---|---|---|
| Th.III | Isotope Geochemistry | Th.III | Chemical Petrology & Crustal Evolution |
| **Practicals Papers : Core Course (CM)** | | **Practicals Papers : Core Course (CM)** | |
| Pr.I | Micropalaeontology | Pr. I | Vertebrate Diversity & Evolution |
| Pr.II | Neotectonics & Earthquakes | Pr. II | Sedimentology |
| Pr.III | Isotope Geochemistry | Pr. III | Chemical Petrology & Crustal Evolution |
| **Skill Enhancement Course (SECM1)** | | **Skill Enhancement Course (SECM2)** | |
| Geological Field Work /course work introduced UNDER RUSA | | Geological Field Report & Viva Voce/course work introduced UNDER RUSA | |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| **Theory papers : Core Course (CM)** | | **Theory Papers: Core Course (CM)** | |
| Th.I: | Mineral Resources & Mineral Economics | Th.I: | Environmental Geology |
| Th.II: | Petroleum Geology | Th. II: | Advanced Groundwater Hydrology |
| Th.III: | Exploration Geology | | |
| **Practical Papers: Core Course (CM)** | | **Practical papers: Core Course (CM)** | |
| Pr. I: | Mineral Resources & Mineral Economics | Pr. I: | Environmental Geology |
| Pr. II: | Petroleum Geology | Pr. II: | Advanced Groundwater Hydrology |
| Pr. III: | Exploration Geology | | |
| **Discipline Specific Elective (DSEM)** | | **Discipline Specific Elective (DSEM)** | |
| Project Oriented Geological Field Work / Assignment based project work | | Project Oriented Field Report / Assignment based project work | |

**THRUST AREAS**: Paleontology & Stratigraphy, Petrology, Hydrogeology & Environmental Geology.
**PLACEMENTS:** There is a Placement Cell in the department, which co-ordinates with the Central Placement Cell of the University and provides guidance and counseling to the students about the job opportunities in various Companies / Institutes.

**ALUMNI RELATIONS**: Alumni Association of the Department (PUGAA) often interacts and hold functions/webinars for the welfare and fulfillment of the aspirations of the alumni.

## INSTITUTE OF FORENSIC SCIENCE & CRIMINIOLOGY

### ABOUT THE INSTITUTE

**VISION - "To create an environment for professionalism & excellence in Forensic Science and train the scientif manpower for serving the criminal justice system."**

Institute of Forensic Science & Criminology (IFSC) was founded in the year 2009 to service the criminal justice system considering the escalating crime rate and the nature of c rime. The Institute was created for training human resource in forensic Science & research and the utilization of upcoming advanced scientific techniques in the discipline. Scientific techniques of every discipline are funding over new applications in crime investigation and establishing proof in the court of law. The country needs experts of these forensic techniques for building a robust judicial and instigation system. The institute is running M.Sc forensic Science (Interdisciplinary Program) and Ph.D. programs. For supporting the criminal justice system, we need to keep pace in developing robust forensic techniques. Therefore the masters (M.Sc.) level empowers a student to use the latest techniques in investigation of crime and Ph.D research program is to explore and validate new scientific techniques for forensic applications. The Institute is committed to train the human resource in producing 'scientific workfare' to meet the need of highly technical personnel to serve the society in an effective and efficient way.

The Institute is unique that it provides training in all aspects related to Forensic Science & Criminology with specialization in Forensic Biology, forensic Chemistry and Forensic Physics and is running is course under choice based credit system (CBCS).

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Assistant Professors | Vishal Sharma **(Chairperson)** | Trace Evidence analysis, Instrumentation, Analytical Chemistry, synthesis & applications of nanoparticles, Sensors, Chemometrics, Questioned Documents. |
| | Shweta Sharma | Colloidal Chemistry, electrochemical Sensors, Solid Phase Microextraction (SPME), Forensic Toxicology, Drug-Drug Interaction, documents examination, Photocatalysis. |
| | Jagdish Rai | DNA Sequencing, Protein Science |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission criteria |
|---|---|---|---|---|
| M.Sc | 19 + 2NRI+1 ** + 1 Foreign National | 2 years | B.Sc /B.Sc (Hons) degree in Forensic Science or any other Graduation Degree with 3-4-5 year duration with minimum 50% marks in the faculty of Science/ Engineering/ Medical / Dental and Pharmaceutical Science of Panjab University or any other University recognized University. | Based on PU-CET (PG): Academics: 50% PU-CET (PG):50% |
| Ph.D | Subject to availability | 3-6 years | See Ph.D. Prospectus 2022 | |

* 5% Concession is admissible in eligibility marks to SC/ST/BC/PwD Candidates
**Seats reserved for in–service candidates from Government Organization. In case of non–availability of in–service candidate, the seat will be converted into General Category.

**TITLES OF SYLLABI:** Detailed syllabus available at://http://puchd.ac.in/syllabus.php

**M.Sc.**

| Semester-I | Semester-II |
|---|---|
| i) General Forensic and Fingerprint Science<br>ii) Forensic Biology<br>iii) Instrumentation<br>iv) Criminology, Criminal Law and Forensic Psychology<br>v) Crime file/Scrap File | i) Molecular Biology and Biochemistry<br>ii) Forensic Chemistry<br>iii) Forensic Physics<br>iv) Quality Management and Statistics<br>v) Seminar/Journal Club |
| **Semester-III** | **Semester-IV** |
| i) Forensic Toxicology and Drugs of Abuse<br>ii) Ballistics<br>iii) Forensic Genomics & Application<br>iv) Forensic Anthropology, Osteology and Odontology<br>v) Thesis work Part-I<br>vi) Statistics | i) Questioned Documents<br>ii) Computer Forensics<br>iii) Forensic Audio-Video Analysis<br>iv) Forensic Explosives<br>v) DNA and Protein Methods<br>vi) Thesis work –Part II |

**THRUST AREAS:** Fingerprint detection using nanoparticles, Analytical techniques for Questioned Document examination, Forensic Toxicology, Extraction of questioned analyte, Drug-drug interactions, Developing drug sensors, SPME techniques for analyte extraction, DNA Forensics.

**PLACEMENTS:** The placement cell of the department endeavors to offer placement services to the students. The students are informed of various opportunities. The students are placed mainly in the state and national government organizations.

**ALUMNI RELATIONS:** The department remains in touch with old students by inviting them in get-togethers/Annual Functions where they share their experience.

# DEPARTMENT OF MATHEMATICS
# (CENTRE FOR ADVNACED STUDY IN MATHEMATICS)

## ABOUT THE DEPARTMENT

The Department was established in 1952 at Hoshiarpur and set up at Chandigarh in 1958. It is one of the best departments of Mathematics of the Indian Universities. It has been recognized as Centre for Advanced Study in Mathematics since 1963 by the U.G.C. TheNational Board for Higher Mathematics has granted the status of Regional Library to the Library of the Department and support the consortium for the online access to Math. Sci. Net, for which the department is the leading partner.

## FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professors Emeritus | R.P. Bambah | Number Theory, Geometry of Numbers, Discrete Geometry |
| | I.B.S.Passi | Algebra |
| | R.J. Hans Gill | Number Theory, Geometry of Numbers, Discrete Geometry |
| | S.K. Khanduja | Algebraic Number Theory |
| | A.K. Aggarwal | Number Theory |
| Professor (CSIR Emeritus) | Madhu Raka | Number Theory, Geometry of Numbers, Algebraic Coding Theory |
| Professors | S.K. Tomar(on leave) | Applied Mathematics, Continuum Mechanics |
| | Savita Bhatnagar | Harmonic Analysis, Real Analysis |
| | Renu Bajaj | Applied Mathematics, Fluid Dynamics |
| | Vanita Verma | Operational Research Optimization |
| | Gurmeet Kaur Bakshi | Algebra, Algebraic Coding Theory |
| | Dinesh K. Khurana **(Chairperson)** | Algebra, Ring Theory |
| Associate Professor (Re-employed) | Vikas Bist | Algebra & Analysis, Linear Algebra |
| Associate Professors | Poonam Sehgal | Algebra, Number Theory & Complex Analysis |
| Assistant Professors | Suman Bala | Continuum Mechanics |
| | Manisha Sharma | Operational Research |
| | Anjana Khurana | Algebra |
| | Sarita Pippal | Computational Fluid Dynamics |
| | Surinder Pal Singh | Real Analysis, Graph Theory |
| | Aarti Khurana | Continuum Mechanics |
| Assistant Professors (UGC) | Dilbag Singh | Applied Mathematics, Continuum Mechanics |
| | Gagandeep Singh | Queuing Theory, Stochastic Modeling, Applied Probability |

## COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Hons.) Mathematics under the framework of Honours School System | 30+3NRI + 2 Foreign National | 3 years | 50% marks in 10+2 examination from a recognized Board / CBSE with Mathematics as one of the subjects. | Based on PU CET (UG)<br>Academics : 25%<br>PU CET (UG) : 75% |

| | | | | |
|---|---|---|---|---|
| B.Sc. (Hons.) Mathematics & Computing under the framework of Honours School System | 15+2NRI + 1 Foreign National | 3 years | 50% marks in 10+2 examination from a recognized Board / CBSE with Mathematics as one of the subjects. | Based on PU CET (UG)<br>Academics : 25%<br>PU CET (UG) : 75% |
| M.Sc. Mathematics under the framework of Honours School System | 40+5 NRI + 2 Foreign National | 2 years | B.Sc. (Hons.) in Mathematics and B.Sc. (HS) in Maths and Computing from the department of Mathematics, PU Chandigarh | Ongoing class |
| | 30+5 NRI +2 Foreign National | 2 years | BA / B.Sc. (General) with 50% marks in Mathematics as a major subject OR BA /B.Sc. with Hons. 50% marks in Mathematics of PU or any other University recognized by PU as equivalent thereto OR B.Sc. (Hons.) in any subject under CBCS with 24 credits in Mathematics as Generic Elective subject | Based on PU CET (PG)<br>Academics : 40%<br>PU CET (PG) : 60% |
| Ph.D. | Subject to availability | 3-6 Years | See Ph.D Prospectus 2022 | |
| *5% Concession is admissible in eligibility marks to SC/ST/BC/PwD candidates<br>INMO awardees can join B.Sc. (Hons.) Department of Mathematics, without appearing in the PU CET (UG) Entrance Test. | | | | |

**TITLE OF SYLLABI:** Detailed Course Curriculum is available at www.puchd.ac.in

## B.Sc. (Hons.) Mathematics under CBCS

| **SEMESTER-I** | | **SEMESTER-II** | |
|---|---|---|---|
| C1 | MAT-C1: Calculus | C3 | MAT-C3: Real Analysis |
| C2 | MAT-C2 : Algebra | C4 | MAT-C4: Differential Equations |
| MAT-AECC1 | English / MIL | MAT-AECC2 | English / MIL |
| AECC1 | Communications / Environment Science | AECC2 | Communications / Environment Science |
| GE1* | MAT - GE1 | GE2* | MAT – GE3 |
| | MAT - GE2 | | MAT – GE4 |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| MAT-C5 | Theory of Real Functions | MAT-C8 | Numerical methods |
| MAT-C6 | Group Theory I | MAT-C9 | Reimann Integration and Series of Functions |
| MAT-C7 | PDE and system of ODE | MAT-C10 | Ring Theory and Linear Algebra 1 |
| SEC1 | | SEC2 | |
| GE3* | MAT-GE5 | GE4* | MAT-GE6 |
| **SEMESTER-V** | | **SEMESTER-VI** | |
| C11 | MAT-C11-Multivariale Calculus | C13 | MAT-C13-Metric Spaces & Complex Analysis |
| C12 | MAT-C12- Group Theory-II | C14 | MAT-C14- Ring Theory and Liner Algebra II |
| DSE1 | | DSE3 | |
| DSE2 | | DSE4 | |
| C: Core courses; GE: General Elective; AECC: Ability Enhancement Compulsory Courses; SEC: Skill Enhancement Courses; DSE; Discipline Specific Elective<br>*GE subjects are to be selected by the students from the pool of GE subjects offered by various Departments of the University. | | | |

**B.Sc. (Hons.) Mathematics & Computing under CBCS Course Structure with Credit Details**

| **SEMESTER – I (26 Credits)** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Code** | **Name of Course** | **Theory / Practical** | **Core** | **GE** | **DSE** | **SEC** | **AECC** |
| MATC-C1 | Calculus | T+P | 4+2 | | | | |
| MATC-C2 | Algebra | T | 6 | | | | |
| MATC-C3 | Fundamentals of Computers and Fortran - 90 | T+P | 4+2 | | | | |
| MATC-AECC1 | | | | | | | 2 |
| MATC-GE1 | | | | 6 | | | |
| **SEMESTER – II (26 Credits)** | | | | | | | |
| **Code** | **Name of Course** | **Theory / Practical** | **Core** | **GE** | **DSE** | **SEC** | **AECC** |
| MATC-C4 | Real Analysis | T | 6 | | | | |
| MATC-C5 | Differential Equations | T+P | 4+2 | | | | |
| MATC-C6 | Programming with C | T+P | 4+2 | | | | |
| MATC-AECC2 | | | | | | | 2 |
| MATC-GE2 | | | | 6 | | | |
| **SEMESTER – III (30 Credits)** | | | | | | | |
| **Code** | **Name of Course** | **Theory / Practical** | **Core** | **GE** | **DSE** | **SEC** | **AECC** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MATC-C7 | Group Theory I | T | 6 | | | | |
| MATC-C8 | Data and File Structures | T+P | 4+2 | | | | |
| MATC-C9 | Theory of Real Functions | T | 6 | | | | |
| MATC-SEC1 | | | | | | 6 | |
| MATC-GE3 | | | | 6 | | | |
| **SEMESTER – IV (30 Credits)** | | | | | | | |
| **Code** | **Name of Course** | **Theory / Practical** | **Core** | **GE** | **DSE** | **SEC** | **AECC** |
| MATC-C10 | Ring Theory and Linear Algebra I | T | 6 | | | | |
| MATC-C11 | Programming with Python | T+P | 4+2 | | | | |
| MATC-C12 | Riemann Integration and series of Functions | T | 6 | | | | |
| MATC-SEC2 | | | | | | 6 | |
| MATC-GE4 | | | | 6 | | | |
| **SEMESTER – V (24 Credits)** | | | | | | | |
| **Code** | **Name of Course** | **Theory / Practical** | **Core** | **GE** | **DSE** | **SEC** | **AECC** |
| MATC-C13 | Probability and Statistics | T | 6 | | | | |
| MATC-C14 | Artificial Intelligence | T | 6 | | | | |
| MATC-DSE1* | Group Theory II | T | | | 6 | | |
| MATC-DSE2 | | | | | 6 | | |
| **SEMESTER – VI (20 Credits)** | | | | | | | |
| **Code** | **Name of Course** | **Theory / Practical** | **Core** | **GE** | **DSE** | **SEC** | **AECC** |
| MATC-C15 | Data Analytics Using R | T+P | 4+2 | | | | |
| MATC-C16 | Numerical Optimization | T | 6 | | | | |
| MATC-DSE3* | Ring Theory and Linear Algebra II | T | | | 6 | | |
| MATC-DSE4 | Research Project | | | | 2 | | |

**Total Credits for B.Sc. (Honours) Mathematics and Computing will be 156 credits**
**(Core: 96 credits, GE: 24 credits, DSE: 20 credits, SEC: 12 credits, AECC: 4 credits)**

**Nature of Courses**

| S.No. | Name | Semester | Remarks |
|---|---|---|---|
| 1. | Core Courses (C) (MATC-C1 to MATC-C16) | I, II, III, IV, V, and VI | Each student of B.Sc. (Honours) Mathematics and Computing will be offered sixteen core courses (6 credits) over six semesters. |
| 2. | Ability Enhancement Compulsory Course (AECC) (MATC-AECC1 to MATC-AECC2) | I and II | Each student of B.Sc. (Honours) Mathematics and Computing has to opt one AECC course in Semester - I and II out of the following:<br>1. English Communication (2 credits)<br>2. Environmental Science (2 credits) |
| 3. | Generic Elective Courses (GE) (MATC-GE1 to MATC-GE4) | I, II, III, and IV | Each student of B.Sc. (Honours) Mathematics and Computing has to opt any one GE course (6 credit) offered by the other Departments of Panjab University for Semester I to IV. |
| 4. | Skill Enhancement Courses (SEC) (MATC-SEC1 to MATC-SEC2) | III and IV | MATC-SEC1: Each student of B.Sc. (Honours) Mathematics and Computing has to opt any one SEC course (6 credit) out of the following.<br>1. PDE and system of ODE (P) (6 credit)<br>2. Discrete Mathematics (6 credit)<br>MATC-SEC2: Each student of B.Sc. (Honours) Mathematics and Computing has to opt for the course: Numerical Methods (P) (6 credit). |
| 5. | Discipline Specific Elective Courses* (DSE*) (MATC-DES1* and MATC-DES3*) | V and VI | MATC-DSE1*: Each student of B.Sc. (Honours) Mathematics and Computing has to opt for the course: Group Theory II (6 credit).<br>MATC-DSE3*: Each student of B.Sc. (Honours) Mathematics and Computing has to opt for the course: Ring Theory and Linear Algebra II (6 credit). |
| 6. | Discipline Specific Elective Courses (DSE) (MATC-DES2 and MATC-DES4) | V and VI | MATC-DSE2: Each student of B.Sc. (Honours) Mathematics and Computing has to opt any one DSE course out of the following.<br>1. Multivariate Calculus (6 credit).<br>2. Number Theory (6 credit).<br>MATC-DSE4: Each student of B.Sc. (Honours) Mathematics and Computing will be given a Research Project (RP), either individually or in a group of 2-3 students. This research project will be of 2 credits. |

| **M.Sc (Hons.) under CBCS** | |
|---|---|
| **SEMESTER-I** | **SEMESTER-II** |
| Every student will have to take five papers given below: | |

| | | | |
|---|---|---|---|
| Core Course-I | MAT MC1-Field Theory & Commutative Algebra-I OR MAT MC2-Groups and Rings | Core Course-VI | MAT MC9-Commutative Algebra-II OR MAT MC10-Modules & Fields |
| Core Course-II | MAT MC3-Topology OR MAT MC4-Real Analysis | Core Course-VII | MAT MC11–Number Theory-I OR MAT MC12–Number Theory-II |
| Core Course-III | MAT MC5-Advanced Complex Analysis OR MAT MC6-Complex Analysis-I | Core Course-VIII | MAT MC13-Lebesgue Integration |
| Core Course-IV | MAT MC7-Linear Programming | Core Course-IX | MAT MC14-Ordinary Differential Equations |
| Core Course-V | MAT MC8-Classical Mechanics | Core Course-X | MAT MC15 - Probability Theory and Random Processes |

The above mentioned courses will be offered to the students depending upon their background.

The students who have studied MAT MC1 in Semester I will have to take MAT MC9 in Semester II. Similarly, the students who have studied MAT MC2 in Semester I will have to take MAT MC10 in Semester II. MAT MC 12 will be offered to those students who have studied its prerequisites in bachelor's degree

| **SEMESTER-III** | | **SEMESTER-IV** | |
|---|---|---|---|
| Core Course XI | MAT MC16-Non-Commutative Ring Theory OR MAT MC17-Linear Algebra and Commutative Algebra-I | Core Course XIV | MAT MC21-Representation Theory of FiniteGroups OR MAT MC22-Commutative Algebra-II |
| Core Course XII | MAT MC18-General Measure Theory OR MAT MC19–Topology | Core Course XV | MAT MC23-Functional Analysis |
| Core Course XIII | MAT MC20-Partial Differential Equations | | |
| The students who have studied MAT MC1 and MAT MC9 in Semesters I & II will have to take MAT MC16 & MAT MC18 in Semester III. Similarly, the students who have studied MAT MC2 and MAT MC10 in Semesters I & II will have to take MAT MC17 & MAT MC19 in Semester III | | The students who have studied MAT MC16 in Semesters III will have to take MAT MC 21 in Semester IV. Similarly, the students who have studied MAT MC17 in Semesters III will have to take MAT MC22 in Semester IV. | |
| Discipline Specific Elective Courses (Students have to choose one or two out of following depending upon their background) | | Discipline Specific Elective Courses (Students have to choose two or three out of following depending upon their background) | |
| MAT MDSE 1 | Computational Techniques-I | MAT MDSE 1* | Computational Techniques-I |
| MAT MDSE 2 | Algebraic Number Theory-I | MAT MDSE 2* | Algebraic Number Theory-I |
| MAT MDSE 3 | Algebraic Coding Theory-I | MAT MDSE 3* | Algebraic Coding Theory-I |
| MAT MDSE 4 | Complex Analysis-II | MAT MDSE 4* | Complex Analysis-II |
| MAT MDSE 5 | Fluid Mechanics-I | MAT MDSE 5* | Fluid Mechanics-I |
| MAT MDSE 6 | Non Linear Programming | MAT MDSE 6* | Non Linear Programming |
| MAT MDSE 7 | Mathematical Statistics | MAT MDSE 7* | Mathematical Statistics |
| MAT MDSE 8 | Mechanics of Solids-I | MAT MDSE 8* | Mechanics of Solids-I |
| MAT MDSE 9 | Numerical Methods for DifferentialEquations | MAT MDSE 9* | Numerical Methods for Differential Equations |
| | | MAT MDSE 10 | Computational Techniques II |
| | | MAT MDSE 11 | Algebraic Number Theory-I |
| | | MAT MDSE 12 | Algebraic Coding Theory-II |
| | | MAT MDSE 13 | Fluid Mechanics-II |
| | | MAT MDSE 14 | Mechanics of Solids II |
| | | MAT MDSE 15 | Partial Differential Equations II |
| | | MAT MDSE 16 | Numerical Methods for differential Equations-II |
| | | | *Will Be Offered If Not Run In Semester-III |
| **SKILL ENHANCEMENT COURSES** | | **SKILL ENHANCEMENT COURSES** | |
| If a student has opted for only one Discipline specific elective course, then he/she may choose one of the following (depending upon the background) | | If a student has opted for only one Discipline specific elective course, then he/she may choose one of the following (depending upon the background) | |
| MAT MSEC 1 | Stochastic calculus | MAT MSEC 1* | Stochastic calculus |
| MAT MSEC 2 | Network Analysis | MAT MSEC 2* | Network Analysis |
| | | | * Will if offered if not run in Semester III |
| **GENERIC ELECTIVE COURSES** | | **GENERIC ELECTIVE COURSES** | |
| If a student has opted for only one Discipline Specific Elective Course and no Skill Enhancement course, then he / she may choose one of the course offered by the following Departments of Panjab University at Masters level (depending upon the background) | | If a student has opted for only two Discipline Specific Elective Course and no Skill Enhancement course, then he / she may chooseone of the course offered by the following Departments of Panjab University at Masters level (depending upon the background) | |
| (i) | Physics | (i) | Physics |
| (ii) | Computer Science | (ii) | Computer Science |
| (iii) | Statistics | (iii) | Statistics |

| | | | |
|---|---|---|---|
| (iv) | Economics | (iv) | Economics |

**THRUST AREA:** Algebra, Continuum Mechanics, Analysis, Optimization.

**PLACEMENTS:** Our students are placed in teaching jobs in Government/private educational institutions.

**ALUMNI RELATIONS:** We invite our distinguished alumni at every academic function in the department. They deliver motivating lectures to the students / faculty.

## DEPARTMENT OF MICROBIOLOGY

### ABOUT THE DEPARTMENT

The department is one of the oldest and pioneer departments of Microbiology. The department has made a remarkable progress in teaching and research since its establishment and has been recognized for research Nationally and Internationally. It has been implementing various schemes and R & D Projects by various govt. agencies like department of Biotechnology (DBT), Dept. of Science and Technology (DST-PURSE, University Grants Commission), other Funding Agencies including Council of Scientific and Industrial Research (CSIR), Indian Council for Medical Research (ICMR), Chandigarh Council of Science and Technology (CCST) etc.

**Research facilities :** The Department has excelled in Medical and Industrial Research and owes the faculty with expertise in almost all the branches of Microbiology like Immunology, Diagnostic Reproductive Biology, Phage Therapy, Microbial Biosensors, Quorum Sensing, Molecular Biology, Food Microbiology, Fermentation Technology, Microbial Diversity and Metabolites, Environmental Microbiology, Enzymes and their Applications etc. The graduates from this department are already employed in various National/International academic, premier research and industrial organizations and International Universities. The department has good modern teaching and research infrastructure.

**Collaborations :** Besides intradepartmental collaborations, the department does have collaborations with PGIMER (CHD), CSIR-IMTECH (CHD), PEC(CHD), CSIR-IHBT (Palampur). The faculty of the department has been conferred awards/recognition at various platforms nationally. The vision of the department is to explore Microbial diversity in Health, Industry and Environment with the mission to use Microbiology in the Service of Society.

**Major research facilities available in the department :** In 2014, the department has shifted to new building in South Campus of the university situated in Sector-25, Chandigarh. The new building has the world class infrastructure and well established departmental Instrumentation Facility. The major equipment available in the department include UV-Visible Spectrophotometers, Ultra Centrifuge, Refrigerated Centrifuge, Ultra Deep Freezer, Orbital Shakers, Water Bath Shakers, Protein Purification System with fraction collector, electrophoresis equipment, BOD Incubators, Gas chromatograph, laboratory fermenter, Fluroscent Microscope, Sonicator, Trans-illuminator, $CO_2$ incubators, Micro Centrifuge, Cold Room, Real Time PCR Machine, Electro-evaporator, ELISA Reader, Lyophilizer, Milipore Water Purification System etc. The Department of Biotechnology, Govt. of India, New Delhi has selected this department for assistance for enhancement of research and teaching in the field of Microbial Biotechnology. UGC has selected the department for Special Assistance Programme (SAP).

### FACULTY

| Particular | Name | Field of Research Specialization |
|---|---|---|
| Professor Emeritus | K. G. Gupta | Applied Microbiology |
| | J. K. Gupta | Industrial Microbiology |
| Scientist Emeritus | Sanjay Chhibber | Medical Microbiology |
| Professors | Prince Sharma | Molecular Microbiology |
| | Vijay Prabha | Medical Microbiology |
| | Praveen Rishi | Medical Molecular Microbiology |
| | Sanjiv Kumar Soni | Food and Fermentation Technology |
| | Kusum Harjai | Applied Medical Microbiology & Immunology |
| | Geeta Shukla | Medical Microbiology |
| Associate Professors | Deepak Kumar Rahi **(Chairperson)** | Industrial Microbiology & Applied Microbiology |
| Assistant Professors | Naveen Gupta | Industrial & Molecular Microbiology |
| | Khem Raj | Medical Microbiology |
| | Seema Kumari | Virology |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission criteria |
|---|---|---|---|---|
| B. Sc. (Hons.) under the framework of Honours School System | 30 + 4NRI + 2 Foreign National | 3 years | 50% marks in 10+2 with English, Physics, Chemistry, Maths, Biology, Biotechnology | Admission based on P.U. CET-(U.G.) Academics: 25% PU-CET(UG):75% |
| M.Sc. Microbiology under the framework of Honours School System | 30 + 4 NRI + 2 Foreign National | 2 years | Ongoing students must have cleared B. Sc. (Hons.) | Ongoing Classes |
| Ph.D | Subject to availability | 3-6 years | See Ph.D Prospectus 2022 | |
| *5% Concession is admissible in eligibility marks to SC/ST/BC/PwD Candidates. | | | | |

**TITLES OF SYLLABI :** Detailed syllabus available at www.puchd.ac.in/syllabus.php

**COURSE STRUCTURE**

B.Sc (Hons. under the framework of Honours School System)

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| C1 | MIC-C1: Biomolecules | C3 | MIC-C3: General Microbiology |

| | | | |
|---|---|---|---|
| C2 | MIC -C2: Cell Biology | C4 | MIC-C4: Molecular Biology |
| AECC1 | MIC-AECC1: English | AECC2 | MIC-AECC2: Environmental Science |
| GE1* | General Bacteriology (To be offered for the students from other Departments) | GE3* | Environmental Microbiology (To be offered for the students from other Departments) |
| GE2* | | GE4* | |

Four core courses in first year will run simultaneously in both semesters under PU-IMBSER

| **SEMESTER-III** | | **SEMESTER-IV** | |
|---|---|---|---|
| C5 | MIC-C5: General Bacteriology | C8 | MIC-C8: Environmental Microbiology |
| C6 | MIC-C6: Industrial Microbiology | C9 | MIC-C9: Medical Microbiology |
| C7 | MIC-C7: Microbial Physiology and Metabolism | C10 | MIC-C10: Food and Dairy Microbiology |
| SEC1 | | SEC2 | |
| GE5* | Industrial Microbiology (To be offered for the students from other Departments) | GE6* | Medical Microbiology (To be offered for the students from other Departments) |

| **SEMESTER-V** | | **SEMESTER-VI** | |
|---|---|---|---|
| C11 | MIC-C11: Medical Bacteriology | C13 | MIC-C13: Molecular Genetics |
| C12 | MIC-C12: Immunology | C14 | MIC-C14: Virology |
| DSE1 | | DSE3 | |
| DSE2 | | DSE4 | |

C: Core Courses; GE: General Elective; AECC: Ability Enhancement Compulsory Courses; SEC: Skill Enhancement Courses; DSE: Discipline Specific Elective

*: GE subjects are to be selected by the students from the pool of GE Subjects offered by various Departments of the University.

| ****SKILL ENHANCEMENT COURSES (any one per semester in semesters 3-4)** | ***DISCIPLINE SPECIFIC SUBJECTS (any two per semester in semesters 5-6)** |
|---|---|
| MIC-SE1: Microbial Quality Control in Food and Pharmaceutical Industries<br>MIC-SE2: Microbial Diagnosis in Health Clinics<br>MIC-SE3: Biofertilizers and Biopesticides<br>MIC-SE4: Food Fermentation Techniques<br>MIC-SE5: Management of Human Microbial Diseases<br>MIC-SE6: Microbiological Analysis of Air and Water | MIC- DSE1: Microbial Biotechnology<br>MIC- DSE2: General Pathology<br>MIC- DSE3: Immunopathology<br>MIC- DSE4: Microbes in Sustainable Agriculture and Development<br>MIC- DSE5: Biosafety and Intellectual Property Rights<br>MIC- DSE6: Instrumentation and Biotechniques MIC- DSE7: Project Work-I (Medical stream)<br>MIC-DSE8: Project Work-II (Non-Medical stream) |

*Courses under these will be offered only if a minimum of 10 students opt for the same

**M.Sc**

| **SEMESTER I** | **SEMESTER II** |
|---|---|
| MMIC C-1 Advances in Microbial Ecology | MMIC C-5 Fermentation Technology |
| MMIC C-2 Pathogenesis of Infectious diseases | MMIC C-6 Advances in Molecular Biology & Biotechnology |
| MMIC C-3 Newer approaches in diagnostic Microbiology | MMIC C-7 Advances in Immunoprophylaxis & Immunotherapy of Infections |
| MMIC C-4 Combined Practical-1 | MMIC C-8 Combined Practical-2 MMIC GE-2 Swayam Paper-II* |
| MMIC GE-1 Swayam Paper-I* | |
| **SEMESTER III** | **SEMESTER IV** |
| MMIC C-9 IPR, Biosafety, Bioinformatics and Biostatistics | MMIC C-14 Journal Club |
| MMICC-10 Advanced Topics in Microbiology –I (Seminar) | MMIC C-15 Research Work (Thesis)** |
| MMIC C-11 Advanced Topics in Microbiology –II (Paper) | MMIC C-16 Research Work (Viva Voce)** |
| MMIC C-12 Project Training Report & Presentation MMIC C-13 Research Work (Review)** | |
| MMIC GE-3 Swayam Paper-III* | |

* Generic Elective (GE) subjects are to be selected by the students from the following pool of subjects available on "Swayam", Free on line free education portal (https://swayam.gov.in/) as recommended by UGC. Courses delivered through SWAYAM are available free of cost to the learners, however students wanting certifications shall be registered, shall be offered a certificate on successful completion of the course, with a little fee. At the end of each course, there will be an assessment of the student through proctored examination and the marks/grades secured in this exam could be transferred to the academic record of the students. UGC has already issued the UGC (Credit Framework for online learning courses through SWAYAM) Regulation 2016 advising the Universities to identify courses where credits can be transferred on to the academic record of the students for courses done on SWAYAM.

1. Bioorganic and biophysical chemistry
2. Organic spectroscopy
3. Application of spectroscopic methods in molecular structure determination
4. Environmental chemistry
5. Forensic chemistry and explosives
6. Forensic biology and serology
7. Food laws and standards

8. Technology of fermented, cheese, ice-cream and by-products

****RESEARCH WORK:** The research work for thesis will start from third semester and will be continued in the fourth semester. The weight age will be of 50 marks in third semester. At the end of semester third, students will submit their literature work in the form of a Review on the topic selected. There will be a presentation before a panel of teachers from the department.

**THRUST AREAS:** Medical Microbiology, Food Microbiology, Industrial Microbiology, Immunology, Environmental Microbiology, Microbial Physiology and Biochemistry, Genetic Engineering and Biotechnology.

**PLACEMENTS:** Though there is 100% off campus placement of the students of Microbiology after M.Sc./Ph.D, efforts are being made to activate the process of on campus placement through Central Placement Cell, Panjab University, Chandigarh.

**ALUMNI RELATIONS & Distinguished Alumni of Department:** To promote the alumni relations, the committee has recently been constituted to activate the process.

## DEPARTMENT-CUM-NATIONAL CENTRE FOR HUMAN GENOME STUDIES AND RESEARCH

### ABOUT THE CENTRE

Department cum National Centre for Human Genome Studies and Research is relatively new education centre established in year 2002. The first sequencing of the human genome in 2002 provided a glimpse of humans at our most basic molecular level. The main goal of our department is to inspire and educate young minds in Genetics and Genomics. Students learn to approach problems and formulate questions that span the full range of biological systems, from genes to cells to medicine to evolution. Research in Genetics and Genomics is quickly becoming the key source of new insights, better understanding and targeted treatments of both rare monogenic diseases and common complex diseases such as coronary heart disease, cancer etc. Our ethos reflects and fosters a passion for discovery and curiosity and a commitment to excellence. The goal of this Centre is to provide the most advanced and comprehensive education possible related to human genome at the post graduate level. We highly value interdisciplinary knowledge and collaboration as the core of our effort. Our research addresses the molecular mechanisms underlying fundamental processes in biology and disease. We apply genetic, biochemical, cell biological, computational and biophysical approaches to study various questions/problems in biology. We are motivated towards understanding of human biology and disease and to develop solutions to societal health problems. Mission is to establish specific scientific programs that will be available to the public, to improve human health and well-being through education and research.

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Associate Professor | Ramandeep kaur **(Chairperson)** | Molecular and Cancer Biology |
| Assistant Professors | Shashi Chaudhary | Genetics & Molecular Biology of Human Disease |
| | Ranvir Singh | Protein Crystallography |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| M.Sc. Human Genomics | 15+ 2 NRI + 1 Foreign National | 2 years | B.Sc. (Pass or Honours) under 10+2+3 pattern of examination with at least 55% marks in Physical, Chemical, Biological, Pharmaceutical Science or in medicine from any University/ Institute recognized by P.U. | Based on P.U. CET-(P.G.) Academics: 50% P.U.CET(PG):50% |
| Ph.D. | Subject to availability | 3-6 years | See Ph.D. Prospectus 2022 | |
| *5% concession is admissible in eligibility marks to SC/ST/BC/PwD candidates | | | | |

**TITLES OF SYLLABI** (Detailed syllabus available at http://puchd.ac.in/syllabus.php )

**M.Sc.**

| | Semester-I | | Semester-II |
|---|---|---|---|
| MHG 101 | Biochemistry and Cell Biology | MHG 201 | Structure Biology & Bioinformatics-I |
| MHG 102 | Molecular Biology | MHG 202 | Immunology |
| MHG 103 | Genetics | MHG 203 | Human Molecular Genetics-I |
| MHG 104 | Analytical Techniques | MHG 204 | Genetic Engineering-Tools and Techniques |
| MHG 105 | Practical based on 101 & 102 | MHG 205 | Practical based on 201 & 202 |
| MHG 106 | Practical based on 103 & 104 | MHG 206 | Practical based on 203 & 204 |
| | **Semester-III** | | **Semester-IV** |
| MHG 301 | Structure Biology and Bioinformatics-II | MHG 401 | Project Work and Presentation |
| MHG 302 | Gene Expression and Epigenetics | MHG 402 | Clinical Round & Viva |
| MHG 303 | Human Molecular Genetics-II | MHG 403 | Educational Tour & Journal Club |
| MHG 304 | Genomics and Proteomics | | |
| MHG 305 | Practical based on 301 & 302 | | |
| MHG 306 | Practical based on 303 & 304 | | |

**THRUST AREAS:** Molecular Biology, Functional Genomics and Proteomics.

**PLACEMENTS**: Most of the students pursue Ph.D. programe after completion of their course while others opt for private sector jobs in clinical research organizations like Dr. REDDYS (Hyderabad), Quantum Solution etc.

**ALUMNI RELATIONS**: Departmental alumni keep visiting and interacting with students and provide their valuable input from their experience, time to time.

## DEPARTMENT OF PHYSICS

### ABOUT THE DEPARTMENT

The Department of Physics was established at Lahore in 1934, moved to Delhi for some time and then to Govt. College, Hoshiarpur (Punjab) after partition. Subsequently, the Department was shifted to Chandigarh in 1958.

The Department had previously received grants under the UGC- COSIP (College Science Improvement Programme) from 1977-83, SAP (Special Assistance Programme) from 1980-88 and COSIST (Committee of Strengthening of infrastructure in Science and Technology) from 1984-91. Since 1988, it has been accorded the status of a Centre of Advanced Study (CAS) by UGC with three major thrust areas: Particle Physics, Nuclear Physics and Solid-State Physics - a unique achievement. At present the Department has the strength of 21 faculty members, 2 UGC Faculty, 36 Assisting staff and 2 daily wage staff, apart from Post-doctoral fellows under various funding schemes as well as project scientists/investigators. There are about 108 research students and 437 B.Sc. (Hons. School) Physics, M.Sc. (Hons. School) Physics, B.Sc. (Hons. School) Physics (Specialization in Electronics) and M.Sc. (Hons. School) (Specialization in Electronics) students on the rolls of the Department. About 150 B.Sc. (Hons. School) students of other departments study Physics subjects as General Elective Courses.

The faculty members have been honoured with Meghnad Saha Award, Goyal Prize (Kurukshetra University), Sir C.V. Raman Award, Hari Om Trust Award, S.N. Satya Murthi Young Scientist Award, DAE Young Scientist Award, Himachal Scientists of the Year award 2011**,** Chinese Academy of Sciences President's International fellowship, Mercator Professorship, Homi Bhaba Fellowship, Emeritus Scientistships, Ramanna Fellowship, Raman Fellowship. They have been elected for Indian Academy of Sciences fellowship, Joliot Curie fellowship, Alexander Von Humboldt fellowships, DFG (German Research Society) Fellowship, BMFT (Ministry of Research and Technology of Germany like DST) fellows, UNESCO/IAEA Fellowship, WE-Heraeus Fellowship, Heinrich Hertz Foundation fellowship, Fulbright Fellowship, Commonwealth fellowship, IN2P3-CNRS Fellowship, France, Third World Academy of Sciences fellowships and UGC National Lecturer Fellowship awards. Our faculty had also served/ is serving at various administrative positions such as Vice-Chancellors of Panjab University and other universities.

The Department is having research collaborations with institutions like Royal Military College of Canada, Canada; University of Notre Dame, USA; Fermilab USA; CERN Geneva; Bonn University Germany; University of Bayreuth, Wuerzburg, Munich and Berlin in Germany, Chemistry Deptt., City College of New York (CUNY), New York; KEK Japan, Chinese academy of Sciences, Shanghai China; ICTP, Trieste; Univ. of Illinois, USA; BNL, USA; Max. Planck Institute, Germany; Univ. of Leipzig, Germany; SUBATECH, Nantes, France; Instt. for Theoretische Physics, Tubingen, Germany; Instt of Nuclear Studies, Warsaw University, Poland; Univ. of Milano, Italy; J.L. Univ., Germany; J.W. Goethe Univ., Frankfurt, Germany; Instt. of Nucl. Physics, Strasbourg, France; University of Surrey, Gilford, U.K.; University of Hawaii, Cincinnati; Virginia Tech., Princeton University, University of Antwerp, Belgium, JINR Dubna Russia, IUC, Kolkata; VECC, Kolkata; TIFR, Mumbai; IAUC., New Delhi; IIT, Kanpur; Delhi University, Delhi; Mumbai University, Mumbai; IIT, Chennai; I.O.P. Bhubaneshwar; H.P. University, Shimla; T.B.R.L., P.G.I.M.E.R., C.S.I.O., Chandigarh, Jammu University, Jammu. The department has MOU with IUAC, New Delhi, for joint faculty appointment and to various academic exchange programs for Accelerator based research.

UGC had sanctioned 3 crores under CAS-V Phase **(2015-2020)** grant under improvement of Infrastructural facilities of the Physics department. Funds of Rs. 3.5 crores for infrastructure development have been sanctioned by the Department of Science and Technology under FIST programme to upgrade Teaching and Research facilities. The Department of Science & Technology has given technical approval for funding the proposal for establishing Panjab University Accelerator Science Centre (6 MV Tandem Accelerator) at P.U. Campus.

**Research Facilities**

Facilities exist in the Department for research in Nuclear Physics, High Energy Physics, Photon-Atom Interaction Studies, Solid State/Condensed Matter Physics, Laser Spectroscopy, Astrophysics and Planetary Science (Space Sciences), Radiometric Dating and Theoretical Physics, leading to the Ph.D. degree.

**Major facilities available in the Department :** (i) Cyclotron, (ii) High Energy Physics (Data Analysis and Detector fabrication Labs.) for studies connected with Collider Physics at CERN and Fermilab., Neutrino Physics at INO and Fermilab., (iii) Facilities for PAC/PAD studies of Hyperfine Interactions (iv) Semi-conductor laboratory, fabrication of thin films, (v) Raman Spectrometer, (vi) Several Nuclear Spectrometers incorporating detectors like HPGe, Si(Li), NaI(Tl), $BaF_2$, and $LaBr_3$ associated with modern electronics, (vii) Data Analysis labs. for Ultra relativistic heavy Ions experiments done at CERN, (viii) High Performance Computational Facility for theoretical studies for modeling physical problems including simulations, (ix) Energy dispersive X-ray fluorescence spectrometers using radioactive exciter sources and X-ray tube for material analysis, and (x) XRD. An 11-inches astronomical Telescope has been installed in the Department as a part of teaching and Public awareness Programs in Astrophysics.

The Department houses Indian Association of Physics Teachers (IAPT) office and actively leads in IAPT, Indian Physics Association activities.

### FACULTY

| Particular | Name | Field of Research Specialization |
|---|---|---|
| Professors Emeritus | K.N. Pathak | Condensed Matter Physics (Theory) |
| | Nirmal Singh | Nuclear Physics (Experimental) |
| | M.M. Gupta | Particle Physics (Theory) |
| | Suman Bala Beri | High Energy Physics (Experimental) |
| Professors | Devinder Mehta | Nuclear Physics (Experimental) |
| | Navdeep Goyal | Condensed Matter Physics (Experimental) |
| | Rajeev K. Puri | Nuclear Physics (Theory) |

| | | |
|---|---|---|
| | **(Chairperson)** | |
| | G.S.S.Saini | At. Mol. Spectroscopy (Experimental) |
| | C. Nagaraja Kumar | Theoretical Physics |
| | S.K. Tripathi | Condensed Matter Physics (Experimental) |
| | Sandeep Sahijpal | Astrophysics & Planetary Sciences (Theory) |
| | Ranjan Kumar *(On leave)* | Condensed Matter Physics (Theory), |
| | B.R. Behera | Nuclear Physics (Experimental) |
| | Vipin Bhatnagar | High Energy Physics (Experimental |
| | Sunita Srivastva *(On leave)* | Condensed Matter Physics (Theory) |
| | Ashok Kumar | Nuclear Physics (Experimental) |
| | J.S. Shahi | Nuclear Physics (Experimental) |
| Associate Professors | K.S. Bindra | Physics Education |
| | Samarjeet Sihotra | Nuclear Physics (Experimental) |
| Assistant Professors | Lokesh Kumar | High Energy Physics (Experimental) |
| | Rajesh Kumar | Condensed Matter Physics (Experimental) |
| | Manish Dev Sharma | Electronics & Communication (Experimental) |
| | Neeru Chaudhary | Instrumentation (Experimental) |
| | Sakshi Gautam | Nuclear Physics (Theory) |
| | Gulsheen Ahuja | High Energy Physics (Theory) |
| Professor (UGC) | Tankeshwar Kumar (*On leave)* | Condensed Matter (Theory), |
| Assistant Professor (UGC) | Dr. Sushil Singh Chauhan | High Energy Physics (Experimental) |

**COURSES OFFERED (SEMESTER SYSTEM)**

| **Course** | **Seats**** | **Duration** | **Eligibility***** | **Admission Criteria#** |
|---|---|---|---|---|
| B.Sc. (Physics) under the framework of Honours School System [***Traditional course***] | 40+6 NRI+2 Foreign National | 3 years | 10+2 examination (Non-Medical/Medical) with 50% marks from recognized Board/CBSE | Based on PU-CET Under Graduate (UG)<br><br>Academics: 25%<br>PU-CET(UG): 75% |
| B.Sc. Physics (*Specialization in Electronics*) under the framework of Honours School System [***Self-financing course***]* | 20+3 NRI+1 Foreign National | 3 years | 10+2 examination (Non-Medical/ Medical) with 50% marks from recognized Board/CBSE | Based on PU-CET (UG)<br>Academics: 25%<br>PU-CET (UG): 75% |
| M.Sc. (Physics) under the framework of Honours School System [***Traditional course***] | 40+6 NRI+2 Foreign National | 2 years | B.Sc. (Pass-course) or B.Sc. (Honours) Physics examination of Panjab University, with Physics and Mathematics as elective subjects with 50% marks, or, any other university examination recognized as equivalent thereto with 50% marks, or, B.Sc. (Honours) in Physics under Choice-based credit system (CBCS) with 50% marks, or, B.Sc. (Honours) in any subject under CBCS with 24 credits in Physics as Generic Elective (GE) subject and Mathematics as Major/GE subject with 50% marks. | Based on PU-CET Post Graduate (PG)<br><br>Academics: 40%<br>PU-CET(PG): 60%<br><br>In addition, all the students after passing B.Sc. (Honours) in Physics of Panjab University campus will continue for the respective M.Sc. (Physics) under the framework of Honours School System. |
| M.Sc. Physics (*Specialization in Electronics*) under the framework of Honours School System | 20+3 NRI+1 Foreign National | 2 years | B.Sc. (Pass-course) or B.Sc. (Honours) Physics examination of Panjab University, with Physics and Mathematics as elective subjects with 50% marks, or, any other university examination recognized as equivalent thereto with 50% marks, or, B.Sc. (Honours) in Physics under CBCS with 50% marks, or, B.Sc. (Honours) in any | Based on PU-CET (PG)<br>Academics: 40%<br>PU-CET(PG): 60%<br>In addition, all the students after passing B.Sc. (Honours) in Physics (*Specialization in* |

| | | | | |
|---|---|---|---|---|
| [***Self-financing course***]* | | | subject under CBCS with 24 credits in Physics as GE subject and Mathematics as Major/GE subject with 50% marks, or, B.Sc. (Honours) Electronics, or, B.Tech/B.E. (Electronics / Electrical / Mechanical or equivalent) with 50% marks. | *Electronics*) of Panjab University campus will continue for respective M.Sc. Physics (*Specialization in Electronics*) under the framework of Honours School System. |
| PhD. | Subject to Availability | 3-6 years | See Ph.D. Prospectus 2022 | |

* The course fees of "***Self-financing courses***" are substantially higher than the "***Traditional courses***".
** Please carefully read the handbook of information (2022) for details regarding the total number of (convertible/non-convertible) available seats in various courses, the fees structure and the eligibility criteria for the various categories.
***5% Concession is admissible in eligibility marks to SC/ST/BC/PwD candidates.

**Important note for candidates:**

a) The online submission of the CET(PG) form alone cannot be considered as the application for admission in M.Sc. courses. The candidates applying for admission in the M.Sc. courses have to separately fill the online application form for admission in Physics Department apart from the CET(PG) online form.

b) The candidates applying for the B.Sc. courses should opt for B.Sc. (Physics) and B.Sc. Physics (*Specialization in Electronics*) under the framework of Honours School System in the online CET(UG) form.

**TITLES OF SYLLABI:** Detailed syllabi available online at http://puchd.ac.in/syllabus.php

## B.Sc. (Physics) under the framework of Honours School System -Choice Based Credit System

| **SEMESTER-I** | | **SEMESTER-II** | |
|---|---|---|---|
| Paper-1 | Mathematical Physics-I | Paper-1 | Electricity and Magnetism |
| Paper-2 | Mechanics | Paper-2 | Waves and Optics |
| Paper-3 | AECC-1: English/Environmental Science | Paper-3 | AECC-2: English/Environmental Science |
| Paper-4 | General Elective Courses (Any two); | Paper-4 | General Elective Courses (Any two); |
| | Mathematics/Chemistry/Computer Sci./ Statistics/Geology/Economics and any of the subjects offered by Biomedical Science/Life Science Deptts. | | Mathematics/Chemistry/Computer Sci./ Statistics/Geology/Economics and any of the subjects offered by Biomedical Science/Life Science Deptts. |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| Paper-1 | Mathematical Physics-II | Paper-1 | Mathematical Physics-III |
| Paper-2 | Thermal Physics | Paper-2 | Quantum Mechanics & Applications |
| Paper-3 | Digital Systems and Applications | Paper-3 | Analog Systems and Applications |
| Paper-4 | Skill Enhancement Courses (Any one): | Paper-4 | Skill Enhancement Courses (Any one): |
| | Physics Enhancement Skills, Computational Physics Skills, Electrical Circuits and Network Skills, Basic Instrumentation Skills, Renewable Energy and Energy Harvesting | | Physics Enhancement Skills, Computational Physics Skills, Electrical Circuits and Network Skills, Basic Instrumentation Skills, Renewable Energy and Energy Harvesting |
| Paper-5 | General Elective Courses (Any one): | Paper-5 | General Elective Courses (Any one): |
| | Mathematics / Chemistry / Biochemistry Biophysics / Geology / Statistics / Economics | | Mathematics/Chemistry/ Biochemistry / Biophysics / Geology / Statistics/ Economics |
| **SEMESTER-V** | | **SEMESTER-VI** | |
| Paper-1 | Digital Systems and Applications | Paper-1 | Electromagnetic Theory |
| Paper-2 | Solid State Physics | Paper-2 | Statistical Mechanics |
| Paper-3&4 | Discipline Specific Elective Courses (Any two): Nuclear Physics, Experimental Techniques, Atomic and Molecular physics, Particle Physics, Physics of Resonance Techniques | Paper-3&4 | Discipline Specific Elective Courses (Any two): Nuclear Physics, Experimental Techniques, Atomic and Molecular physics, Particle Physics, Physics of Resonance Technique |

**B.Sc. Physics (Specialization in Electronics) under the framework of Honours School System -Choice Based Credit System.**

| **SEMESTER-I** | | **SEMESTER-II** | |
|---|---|---|---|
| Paper-1 | Mathematical Physics-I | Paper-1 | Electricity and Magnetism |
| Paper-2 | Mechanics | Paper-2 | Waves and Optics |
| Paper-3 | AECC-1: English/Environmental Science | Paper-3 | AECC-2: English/Environmental Science |
| Paper-4 | General Elective Courses (Any two); | Paper-4 | General Elective Courses (Any two); |
| | Mathematics/Chemistry/Computer Sci./ Statistics/Geology/Economics and any of the subjects offered by Biomedical Science/Life Science Deptts. | | Mathematics/Chemistry/Computer Sci./ Statistics/Geology/Economics and any of the subjects offered by Biomedical Science/Life Science Deptts. |

| SEMESTER-III | | SEMESTER-IV | |
|---|---|---|---|
| Paper-1 | Mathematical Physics-II | Paper-1 | Mathematical Physics-III |
| Paper-2 | Thermal Physics | Paper-2 | Quantum Mechanics & Application |
| Paper-3 | Elements of Modern Physics | Paper-3 | Analog Systems and Applications |
| Paper-4 | Skill Enhancement Courses (Any one): | Paper-4 | Skill Enhancement Courses (Any one): |
| | Physics Enhancement Skills, Computational Physics Skills, Electrical Circuits and Network Skills, Basic Instrumentation Skills, Renewable Energy and Energy Harvesting | | Physics Enhancement Skills, Computational Physics Skills, Electrical Circuits and Network Skills, Basic Instrumentation Skills, Renewable Energy and Energy Harvesting |
| Paper-5 | General Elective Courses (Any one): | Paper-5 | General Elective Courses (Any one): |
| | Mathematics/ Chemistry/ Biochemistry/Economics/Computer science/Statistics/ Geology and any of the subjects offered by Biomedical Science/Life Science Deptts. | | Mathematics/ Chemistry/ Biochemistry / Economics/ Computer science/Statistics/ Geology and any of the subjects offered by Biomedical Science/Life Science Deptts. |
| **SEMESTER-V** | | **SEMESTER-VI** | |
| Paper-1 | Quantum Systems and Applications | Paper-1 | Electromagnetic Theory |
| Paper-2 | Solid State Physics | Paper-2 | Statistical Mechanics |
| Paper-3&4 | Discipline Specific Elective Courses (Any two): Nuclear Physics, Dissertation and Experimental Techniques, Practicals, Communication Systems, Atomic and Molecular Physics, Particle Physics, Physics of Devices and Instruments. | Paper-3&4 | Discipline Specific Elective Courses (Any two): Nuclear Physics, Dissertation and Experimental Techniques, Communication Systems, Atomic and Molecular Physics, Particle Physics, Physics of Devices and Instruments. |

**M.Sc. (Physics) under the framework of Honours School System.**

| SEMESTER-I | SEMESTER-II |
|---|---|
| PHY-MC1: Mathematical Physics-I | PHY-MC6: Mathematical Physics |
| PHY-MC2: Classical Mechanics | PHY-MC7: Statistical Mechanics |
| PHY-MC3: Quantum Mechanics | PHY-MC8: Relativistic Quantum Mechanics and Quantum Field Theory |
| PHY-MC4: Electronics-I | PHY-MC9: Classical Electrodynamics |
| PHY-MC5 : Physics Laboratory<br>PHY-MC5A: Practical Laboratory-I<br>PHY-MC5B: Computer Laboratory-I | PHY-MC10 : Physics Laboratory<br>PHY-MC10A: Practical Laboratory-II<br>PHY-MC10B: Computer Laboratory-II |
| **SEMESTER-III** | **SEMESTER-IV** |
| PHY-MC11: Condensed Matter Physics – I | PHY-MC15: Nuclear Physics-II |
| PHY-MC12: Nuclear Physics - I | PHY-MC16:Particle Physics-II |
| PHY-MC13: Particle Physics - I | PHY-MC17: Condensed Matter Physics-II |
| PHY-MC14: Physics Laboratory-III | Discipline Specific Elective Course-3 |
| Discipline Specific Elective Course-1 | Discipline Specific Elective Course-3 |
| Discipline Specific Elective Course-2 | General-Elective Course-2 |
| General-Elective Course-1 | |

**M.Sc. Physics (Specialization in Electronics) under the framework of Honours School System.**

| SEMESTER-I | SEMESTER-II |
|---|---|
| PHE-MC1: Mathematical Physics-I | PHE-MC6: Mathematical Physics-II |
| PHE-MC2 : Classical Mechanics | PHE-MC7: Statistical Mechanics |
| PHE-MC3 : Quantum Mechanics | PHE-MC8: Relativistic Quantum Mechanics and Quantum Field Theory |
| PHE-MC4: Electronics-I | PHE-MC9: Classical Electrodynamics |
| PHE-MC5 : Physics Laboratory<br>PHE-MC5A: Practical Laboratory-I<br>PHE-MC5B: Computer Laboratory-I | PHE-MC10 : Physics Laboratory-II<br>PHE-MC10A: Practical Laboratory-II<br>PHE-MC10B: Computer Laboratory-II |
| **SEMESTER-III** | **SEMESTER-IV** |
| PHE-MC11: Condensed Matter Physics-I | PHE-MC15 - Electronics V - Advanced Microcontrollers and Microprocessors |
| PHE-MC12: Electronics-III-Microprocessors and Microcontrollers | PHE-MC16 - Electronics VI - Integrated and VLSI Circuit design |
| PHE-MC13: Electronics IV- Electronics Instrumentation & Power Electronics | PHE-MC17 - Electronics VII - Digital Signal Processing |
| PHE-MC14: Physics Laboratory-III and project work | Discipline Specific Elective Course-3 |
| Discipline Specific Elective Course-1 | Discipline Specific Elective Course-4 |
| Discipline Specific Elective Course-2 | General-Elective Course-2 |
| General-Elective Course-1 | |

**THRUST AREAS:** Nuclear Physics (Experimental), Nuclear Physics (Theory), Particle Physics (Experimental), Particle Physics (Theory), Condensed Matter Physics (Experimental), Condensed Matter Physics (Theory). Other research areas include Astrophysics and Planetary Sciences (Space Sciences), Molecular Spectroscopy and Physics Education.

**PLACEMENTS:** The students pursue career in teaching and research after qualifying CSIR/UGC NET. Students qualify various entrance examination/interviews for pursuing research in premier institutes like IISc, TIFR, BARC, DRDO, ISRO, IMSc, RRI, PRL, IIT and IISER. Students also qualify GATE to pursue professional courses, like M.Tech., MCA, etc. Students also qualify GRE for further studies abroad. Significant number of students go for Post-Graduation at TIFR, IISc, IMSc, and IITs after qualifying B.Sc (Hons.) from PU. Students are also placed through PU Central Placement cell.

**ALUMNI RELATIONS:** The Physics Department has an association of its alumni. Annual meeting of the Physics Department Alumni is a regular feature and held in the month of December. It gives a platform to its alumni to share their experiences and also act as motivator for the students of the Department.

## DEPARTMENT OF STATISTICS

### ABOUT THE DEPARTMENT

The Department of Statistics was established in 1964 as a part of Mathematics Department and it has been an independent Department since 1974.

The Department offers M.Sc. and Ph.D. Courses in Statistics. The courses are designed to develop analytic and inferential aptitude of the students through theory and rigorous practical assignments along with exposure to practical training during the course of their study.

The Department has been receiving grants under Special Assistance Programme of UGC since April, 2004. At present, the Department is getting financial support from UGC as it has been recognised as DSA (Department under Special Assistance), Phase-III and this shall continue till March 31, 2021. It was a COSIST Department under another UGC scheme, and also a FIST Department under a scheme of the Department of Science and Technology of the Government of India.

It is among one of the active departments in the country carrying out research in the fields of Multiple Comparison Procedures, Reliability and Survival Analysis, Statistical Inference and Applied Statistics (Actuarial Statistics, Bio-Statistics, Econometrics and Income Distributions).

The Department has well equipped Computer laboratory with access to softwares like MINITAB, SPSS, SYSTAT, R, S-PLUS, PYTHON and STATGRAPHICS. The students are given training for usage of R and SPSS for solving their practical assignments. To run the practicals and research work smoothly and without interruption, the department is in possession of a 125 KVA silent DG SET.

Eminent Statisticians from India and other countries keep visiting the Department frequently for delivering lectures and research collaboration. The faculty members attend National and International conferences. Interaction with neighbouring industries in the field of process control and with institutes like PGIMER, GMCH, NIPER, IMTECH CRRID , Census and NITTER etc. for providing research consultancy to doctors and researchers is another highlight of the Department of Statistics. The faculty members also collaborate with sister departments for research and data analysis.

The Department of Statistics has an independent Library which has on shelf more than 4000 books and access to more than 30 journals.

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professors | Kanchan K. Jain | Reliability, Survival Analysis, Distribution Theory, Actuarial Statistics, Bio-Statistics, Measurement Error Models, Income Inequality |
| | Sangeeta Chopra | Applied Statistics, Income Inequality & Lorenz Dominance, Environmental Statistics, Statistical Inference |
| | Narinder Kumar | Statistical Inference and Multiple Comparison Procedures |
| | Suresh K. Sharma | Biostatistics, Statistical Modeling, Ranking and selection and related estimation problems, Statistical Inference, Applied Statistics, Predictive Modeling. |
| Assistant Professors | Manoj Kumar | Linear Models, Econometrics |
| | Anju Goyal **(Chairperson)** | Ranking and Selection Methodology, Multiple Comparison Procedures, Statistical Inference, Sampling Techniques. |
| Programmer | Mr. Harminder Singh Deosi | Statistical Programming, Pattern Recognition |

### COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| M.Sc. (Statistics) | 34+5 NRI + 2 Foreign National | 2 years | BA/B.Sc. (General or Honours) with 50% marks in Math/Stat as major subject of Panjab University or any other university recognized by Panjab University as equivalent thereto.<br>OR<br>BA/B.Sc. (General or Honours) under CBCS with 50% marks in GE Math/Stat of Panjab University or any other University or any other University recognized by Panjab University as equivalent thereto (as per UGC/PU General Guidelines) | Based on P.U. CET (PG)<br>Academics-50%<br>PU CET (PG)-50% |
| Ph.D. | 08 | 3-6 years | See Ph.D. Prospectus 2022 | |
| * 5% Concession is admissible in eligibility marks to SC/ST/BC/PWD candidates. | | | | |

** For calculation of Merit, Marks of other Universities will be normalized to 2400 marks which are 3-years aggregate marks of B.A/B.Sc. (Gen.) of Panjab University.
*** 15% weightage will be given to those candidates who have done B.Sc. (Honours) only in the subject of Statistics.

**TITLES OF SYLLABI:** Detailed syllabi available at https://puchd.ac.in/syllabus.php

**M. Sc. (Statistics)**

| **Semester-I** | | **Semester-II** | |
|---|---|---|---|
| Stat 101 | Linear Algebra | Stat 201 | Numerical Techniques Using (Theory 1/2 , Practical 1/2) |
| Stat 102 | Distribution Theory (Theory 3/4, Practical 1/4) | Stat 202 | Estimation and Testing of Hypotheses (Theory 3/4, Practical 1/4) |
| Stat 103 | Statistical Methods with Packages (Theory 3/4, Practical 1/4) | Stat 203 | Sampling Theory and Official Statistics (Theory ¾, Practical ¼) |
| Stat 104 | Real Analysis | Stat 204 | Complex Analysis |
| Stat 105 | Course selected from module | Stat 205 | Course selected from module |
| **Semester-III** | | **Semester-IV** | |
| Stat 301 | Nonparametric Inference (Theory 3/4, Practical 1/4) | Stat 401 | Multivariate Analysis (Theory 3/4, Practical 1/4) |
| Stat 302 | Statistical Process and Quality Control (Theory 3/4, Practical 1/4) | Stat 402 | Design and Analysis of Experiments (Theory 3/4, Practical 1/4) |
| Stat 303 | Linear Inference (Theory 3/4, Practical 1/4) | Stat 403 | Course selected from module/*Course selected from the sister Dept. under CBCS system |
| Stat 304 | Course selected from module/ *Course selected from the sister Dept. under CBCS system | Stat 404 | Course selected from module/*Course selected from the sister Dept. under CBCS system |
| | | Stat 405 | **Project** (It will start from Sem.-III and will end in Sem.-IV) |
| | **Module** | | **Module** |
| M 1 | Actuarial Statistics | M 7 | Operations Research (Theory 3/4, Practical 1/4) |
| M 2 | Categorical Data Analysis | M 8 | Reliability |
| M 3 | Econometrics (Theory 3/4, Practical 1/4) | M 9 | Simultaneous Inference |
| M 4 | Economic Statistics | M 10 | Statistical Simulation and Computational Using R (Theory 1/2, Practical 1/2) |
| M 5 | Advanced Inference (Theory 3/4, Practical 1/4) | M 11 | Stochastic Processes |
| M 6 | Measure and Probability Theory | M 12 | Survival Analysis |

*** Math, Physics and Computer Science are the sister department for M.Sc. (Statistics) students under the CBCS System.**

**THRUST AREAS:** Multiple Comparison Procedures, Reliability and Survival Analysis, Statistical Inference and Applied Statistics (Actuarial Statistics, Bio-Statistics, Econometrics and Income Distributions).

**PLACEMENT:** Some good companies visit the department for placing students as Analysts and Data Scientists. Prominent among these are Tata Consultancy Services and Annik Technologies.

**ALUMNI RELATIONS:** The Alumni Association of the department named as **Statistics Students Alumni Reunion (SSAR)** has two hundred members. The efforts are on for inclusion of more members. Some alumni are highly placed as IAS, IPS, ISS, RBI Officers, research officers and analysts. They keep on providing guidance to the department.

## CENTRE FOR MEDICAL PHYSICS

### ABOUT THE CENTRE

The Centre for Medical Physics was created in 2007, as joint venture of Panjab University and Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, to utilize technology dependent specialties coming out of the new scientific innovations for the immediate need of the society, i.e. good health. Medical Physics is an established clinical specialty with wide ranging applications in Radiotherapy Planning and treatment. It can be defined as embracing all applications of radioactive sources in the treatment of cancerous and non-cancerous diseases. The students of Medical Physics discipline gain knowledge about different equipments used in Radiotherapy planning and treatment and their quality assurances. Medical Physicists play a leading role in the areas of radiation safety and development of instrumentation/technology for use in radiation therapy and diagnostic radiology. There is an ample scope for research in the area of medical physics. Atomic Energy Regulatory Board (AERB) is the regulatory body for the M.Sc. Medical Physics Course. The syllabus of Medical Physics course has been designed in such a way that it shall make the student a competent Medical Physicist, Researcher, Radiation Safety Officer and Teacher after qualifying this course. In addition, a certification for the Radiation Safety Officer (Level-III) from the Atomic Energy Regulatory Board (AERB) to the students is mandatory for them to be qualified in running the radiation facilities independently and handling of the treatment of patients.

### FACULTY

| **Designation** | **Name** | **Field of Research Specialization** |
|---|---|---|
| Assistant Professor | Vivek Kumar **(Chairperson)** | Experimental Nuclear Physics & Medical Physics |

**COURSES OFFERED (SEMESTER SYSTEM):**

| **Course** | **Seats**** | **Duration** | **Eligibility*** | **Criteria** |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| M.Sc. | 10+ 2 NRI | 3 years | B.Sc. (Regular course) first class with Physics subject (studied for three years) and Mathematics as one of the subject (studied for minimum two years) from a recognized university. The candidates who studied B.Sc. through correspondence and open university stream are not eligible. | Based on P.U.C.E.T. (PG)<br>P.U.C.E.T. (PG): 60%<br>Academics: 40% |
| Ph.D. | Subject to availability | 3-6 years | See Ph.D. Prospectus 2022 | |
| *5% Concession is admissible in eligibility marks to SC/ST/BC/PwD candidates<br>**There are no additional seats as mentioned in Handbook of Information-2022. | | | | |

**TITLES OF SYLLABI:** Detailed syllabi available online at http://puchd.ac.in/syllabus.php

### M.Sc. (Medical Physics)

| Semester I | Semester II |
|---|---|
| Cytology and Fundamental Anatomy of Human Body | Basic Physiology and Cancer Biology |
| Radiation Detection and Measurements | Analog and Digital Electronics |
| Radiation Physics and Ethics | Applied Mathematics, Biostatistics and Computer Applications |
| Radiation Biology | Bio-Medical Applications of Radioisotopes |
| **Semester III** | **Semester IV** |
| Radiotherapy Equipments and Quality Assurances | Brachytherapy Treatment Planning and Radiobiological |
| Medical Imaging Equipments and Quality Assurances | Clinical Dosimetry and Standardization |
| Basics of Radiation Dosimetry | Principles of Radiation Protection and Radiation Safety |
| Teletherapy Treatment Planning | Recent Advances in Radiotherapy and Special Techniques |
| **Third Year** Internship with Dissertation | |

**THRUST AREAS:** External Beam radiotherapy, Brachytherapy, Radiobiology, Radiation Protection.

**PLACEMENTS:** The Centre for Medical Physics has 100% placements in the medical Institutions / Universities, accelerator/reactor laboratories. Our students have got placements in the medical institutions like PGIMER (Chandigarh), Govt. Medical College (Chandigarh), Institute of Liver and Biliary Sciences (New Delhi), IGMC (Shimla) and many other hospitals in the country. Students are also pursuing Ph.D. in India and abroad.

**ALUMNI RELATIONS**: The alumni are invited to celebrate International Day of Medical Physics every year on 7th November on the occasion of birthday of Nobel Laureate Marie Curie and annual alumni meet. It gives a platform to our alumni to share their experiences and also act as motivator for the students of the Centre.

## DEPARTMENT OF MICROBIAL BIOTECHNOLOGY

### ABOUT THE DEPARTMENT

The department was founded as 'Centre for Microbial Biotechnology' at Panjab University in July 2008 under the aegis of "Centre for Emerging Areas in Science and Technology", with the aim of catering to the needs of the Biotechnology industry. Over the years, the Centre has evolved and transformed into a full-fledged independent department of the University. Currently, it is running from South Campus, Near Dental College, Sector- 25, Panjab University, Chandigarh. The department runs Master's and Doctoral degree program.

The M.Sc. program of the department has been designed in consultation with the experts from both academia and industries keeping in mind the requirements and challenges of the microbial biotechnology research and its translation, along with entrepreneurship. The M.Sc. course comprises of four semesters. First three semesters are dedicated to strengthen theoretical and practical foundation of the students while the fourth semester is dedicated to a research project/dissertation and seminars. The Ph.D. program is open to students who would like to do research in relevant fields.

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Associate Professor | Rohit Sharma | Industrial Microbiology & Biotechnology |
| Assistant Professors | Rachna Singh **(Chairperson)** | Medical Microbiology |
| | Samer Singh **(On Long Leave)** | Microbial Biotechnology |

### COURSE OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission criteria |
|---|---|---|---|---|
| M. Sc. | 25+02 NRI + 01 Foreign National | 2 Years | Bachelors degree in any field of biological sciences including Biotechnology | Based on P.U. CET-(P.G.)<br>Academics: 50%<br>PU(CET(PG): 50% |
| Ph.D. | Subject to availability | 3-6 Years | See Ph.D. Prospectus 2022 | |
| *5% Concession in admissible in eligibility marks to SC/ST/BC/PwD Candidates | | | | |

**TITLES OF SYLLABI**: Detailed course curriculum available at
https://puchd.ac.in/includes/syllabus/2020/20200928171403-m.sc.microbialbiotechnology2020-21.pdf?202104363202

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| Paper-1 | MBT-101 Microbial Biodiversity and Physiology | Paper-1 | MBT-201 Medical Microbiology |
| Paper-2 | MBT-102 Immunology and Immunotechnology. | Paper-2 | MBT-202 Molecular Biology |
| Paper-3 | MBT-103 Genetics and Recombinant DNA Technology | Paper-3 | MBT-203 Industrial Microbiology-1 (Health, Food, Enzymes) |
| Paper-4 | MBT-104Microbial Biochemistry and Enzymology | Paper-4 | MBT-204 Bioinformatics & Biostatistics |
| Paper-5 | MBT-105 Bioprocess Engineering | Paper-5 | MBT-205 Intellectual Property Rights (IPR), Bioethics & Entrepreneurship |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| Paper-1 | MBT-301 Advances in Microbial Biotechnology (Genomics, Proteomics, Metabolomics) | Paper-1 | MBT-401 Seminar & Tutorials |
| Paper-2 | MBT-302 Industrial Microbiology-II (Environment, Biofuels, Chemicals, Biomass, Protocols) | Paper-2 | MBT-402 Dissertation |
| Paper-3 | MBT-303 Bio-instruments and their Applications | | |
| Paper-4 | MBT-304Microbial Identification, Diagnostics & Nano-biotechnology | | |
| Paper-5 | MBT-305 Tutorials | | |

**THRUST AREAS:** Extremozymes, Antimicrobials, Biofilms, Vaccine Development

**PLACEMENTS:** Placement process has been initiated in the department.

**ALUMNI RELATIONS*:*** Many students have qualified national level entrance tests for enrolment in Ph.D. and are pursuing Ph.D. programme. Many students have joined corporate jobs; many students have established their own start-up companies.

## CENTRE FOR NANO SCIENCE AND NANO TECHNOLOGY

### ABOUT THE CENTRE

The research oriented M.Tech progrmame in Nanoscience and nanotechnology was started in 2005 in the University Centre for Instrumentation Micro-electronics (UCIM). Being the first course of its kind in northern part of the country, it was a challenging task to have undertaken. In 2008, the course was placed under the newly formed Centre for Nanoscience and Nanotechnology under University Institute for Emerging Areas in Science and Technology.

The course is of 2 years duration and interdisciplinary in nature emcompassing the areas of Chemistry, Physics, Biology and Engineering. It comprises of conceptual knowledge of nanoscience and nanotechnology, including preparation of nanomaterials, their characterization and applications. Hands-on training is provided to the students at central Sophisticated Analytical Instrumentation Facility (SAIF) of Panjab University on the various instruments relevant to nanotechnology (Electron Microscopes – SEM & TEM), FT NMR Spectrometer (400 Mhz), FTIR/IR and Raman Spectrophotometer, UV-VIS-NIR Spectrophotometer, X-Ray Diffractometer (Powder method), HPLC, Fluorescence Spectrophotometer). The Final year students do their projects in collaboration with industry and reputed laboratories and institutions across India. The passing out students have found excellent employment / research positions at various industries and institutions.

The Centre has close collaboration with national scientific institutions in the country like NPL-Delhi, IIT-Ropar, CSIO-Chandigarh, CSIR-Delhi, NIPER-Mohali and IHPT-Palampur etc. There have been regular interactions with the faculty from these organizations through visits and guest lectures. The centre has recently signed MOU with Saitama University, Japan for students exchange programme.

The Centre is mainly focused on imbibing up-to-date learning in the field of nanoscience and nanotechnology. The Centre is also involved in cutting edge research and innovation through active research and creating state of the art research infrastructure. Faculties of CNSNT are also involved in extensive collaborations with premier research infrastructure. faculties of CNSNT are also involved in extensive collaboration with premier research institutes worldwide and are actively engaged in developing novel nanomaterials' bio sensing, solar energy harvesting and drug delivery & healthcare, gasensing energy storage devices.

### FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Professor | Sunil Kumar Arora **(Chairperson)** | Synthesis and characterization of novel nanomaterials, nano-magnetism, Nano-electronics, Spin-electronics, Epitaxial growth using MBE and sputtering, nanofabrication, Engineering nanoscale defects, 2D layered materials (graphen and transition metal dichalcogenides) synthesis and hetero-interfaces devices. |
| Assistant Professors | Jadab Sharma | Synthesis of new-age materials, assemblies and fabrication of devices based on such materials for their various applications in nano-plasmonics and photonics and solar energy harvesting. |
| | Akash Katoch | Interface Engineering of Nanomaterials, Chemiresistive gas sensor, Heavy metal ion detection and energy storage devices |
| | Bharat Bajaj | Nanomaterials fabrication, Electrospinning, carbon nanofibers |
| Assistant Professor (Temporary) | Richa Rastogi Thakur | Nano Materials based biosensors for healthcare applications |

**COURSE OFFERED (SEMESTER SYSTEM)**

| Course | Seats | Duration | Eligibility* | Admission criteria |
|---|---|---|---|---|
| M.Tech | 15+3 NRI + 1 Foreign National | 2 Years | Must have qualified GATE with Bachelor's degree (4 years after 10+2) in Engineering / Technology i.e. B.E. / B.Tech (in any branch) or Master's Degree in Physics / Chemistry / Biophysics / Biochemistry / Microbiology / Biotechnology / Nanoscience / Electronics with minimum 50% marks in the aggregate. | Merit based on GATE score and if the seats are not completely filled, candidates without GATE will be allowed on the Academics Merit List. |
| *5% Concession in admissible in eligibility marks to SC/ST/BC/PwD Candidates | | | | |

**TITLES OF SYLLABI**: Detailed course curriculum available at http://puchd.ac.in/syllabus.php

**M.Tech.**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| MNT6101 | Foundation of Nanoscience Quantum and Statistical Mechanics | MNT6201 | Chemistry of Nanomaterials and Fabrication |
| MNT6102 | Basics of Biology and Biotechnology in Nanoscience and Nanotechnology | MNT6202 | Nano-Biotechnology |
| MNT6103 | Foundation of Nanoscience-Physical Chemistry aspects | MNT6203 | Physics of Nanomaterials |
| MNT6104 | Synthesis and Characterization of Nano-material | MNT6204 | Semiconductor devices in Nanoscience and nanotechnology MEMS and NEMS |
| MNT6105 | Scientific Computation and simulation in Nanoscience and Nanotechnology-I | MNT6205 | Advanced Nanomaterials characterization |
| MNT6106 | Laboratory-I | MNT6206 | Laboratory II |
| | | MNT6207 | Scientific computation and Simulation in Nanoscience and Nanotechnology II |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| MNT 7101 | Supramolecular and surface Chemistry of Molecular Devices | MNT 7201 | Major Project & Thesis |
| MNT 7102 | Nanocomposites: Structure Properties and Performance | MNT 7202 | Seminar |
| MNT 7103 | Project & Thesis Preliminary | | |
| MNT 7104 | Laboratory III | | |

**THRUST AREAS**:

- Use of nanomaterial in Sensing Applications, Nanoparticles in Immunodiagnostics and Healthcare Applications, Metallic Nanoparticles for Pesticide and Contaminants Detection, Design of Polymer Nanocomposites.
- 2D layered materials, Graphene based Devices, Transition Metal Dichalcogenides for Photovoltaic, Optoelectronics.
- Third generation solar cells and interconnect materials.
- Nano-plasmonics and Photonics
- Interface Engineering of nanomaterials, Chemiresistive gas sensor. Heavy metal ion detection and energy storage devices.
- Nanomaterials fabrication, Electrospining Carbon Nanofibers.

## CENTRE FOR NUCLEAR MEDICINE

**ABOUT THE CENTRE**

Nuclear medicine is a medical specialty concerned with the use of safe and small amounts of radioactive materials for diagnostic, therapeutic, and research purposes. More specifically, nuclear medicine is a part of molecular imaging because it produces images which reflect biological processes that take place at the cellular and subcellular levels. Though there are many diagnostic techniques currently available, nuclear medicine uniquely provides information about both the structure and function of virtually every major organ system within the body. It is this ability to characterize and quantify physiologic function which separates nuclear medicine from other imaging modalities, such as x-ray, MRI and ultrasound. A typical nuclear medicine study involves the administration of a radionuclide into the body in order to obtain images of the organs, to perform various body function studies and to treat diseases.

Nuclear medicine experts designated as Nuclear Medicine Physicists are highly skilled individuals and their responsibilities include performing in vivo, radiation safety and quality control procedures. Other responsibilities which include operating the cameras that create images including patient positioning and processing the data for research purposes. The discipline of nuclear medicine also produces dedicated scientists who develop radiopharmaceuticals/radioisotopes for the imaging of organs and therapies.

**Vision and mission of the Centre**

Nuclear medicine is an emerging area in medicine and is growing at a fast pace in India and there is an urgent need for trained human resource as medical physicists and radiation safety officers for running nuclear medicine departments and industries that use radioisotopes. Therefore, the centre shall provide trained manpower to cater the needs of various hospitals, medical

colleges/Institutes and Industry in India and abroad. The mission of the M.Sc. Nuclear Medicine Program at Panjab University is to provide the students an opportunity to achieve expertise both in diagnostic imaging and therapeutics with clinical hands on experience in Nuclear Medicine. The Centre imparts a quality education leading to the award of degree in Masters of Science in Nuclear Medicine and train the students for national/international eligibility test to be designated as certified Radiation safety officers and medical physicists.

**Unique features of the course**

Panjab University is the second institution after AIIMS to start M.Sc. Course in Nuclear Medicine, which is approved by Atomic Energy regulatory board of India. The students shall get ample opportunity for hands on clinical training in the 2nd year of the course.

**FACULTY**

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Assistant Professor | Dr. Vijayta D. Chadha **(Chairperson)** | Radiation biology and Radiopharmacy |

**COURSES OFFERED (SEMESTER SYSTEM):**

| Course | Seats | Duration | Eligibility criteria* | Admission criteria |
|---|---|---|---|---|
| Ph.D. | Subject to availability | 3-6 years | See Ph.D Prospectus 2022 | |
| *5% Concession is admissible in eligibility requirement to SC/ST/BC/PwD candidates<br>**There are no additional seats as mentioned in Handbook of Information - 2022 | | | | |

**TITLES OF SYLLABI:** Detailed syllabus is available at https://nuclearmedicine.puchd.ac.in/

**M.Sc.**

| SEMESTER-I | | SEMESTER-II | |
|---|---|---|---|
| **i)** | Human Anatomy and Cell physiology | **i)** | Human Physiology, Immunology and Cancer Biology |
| **ii)** | Radiation Physics and Applied Mathematics | **ii)** | Electronics, Biomedical instrumentation and Techniques |
| **iii)** | Radiation Biology and Chemistry | **iii)** | Biostatistics and Computer applications in Nuclear Medicine |
| **iv)** | Radiation Detection and Measurements | **iv)** | Medical Applications of Radioisotopes |
| **SEMESTER-III** | | **SEMESTER-IV** | |
| **i)** | Nuclear Medicine Instrumentation | **i)** | Medical Cyclotron, PET/CT & Allied Instrumentation |
| **ii)** | Radiological Protection & Dosimetry-I | **ii)** | Radiological Protection & Dosimetry-II |
| **iii)** | Principles and practice of Radiopharmacy | **iii)** | Nuclear Medicine Imaging & Radionuclide Therapy |
| **iv)** | Nuclear Medicine Imaging and Non-Imaging Procedures | **iv)** | Recent advances in Nuclear Medicine. |

**THRUST AREA:** To educate individuals to become high quality nuclear medicine technologists and Radiation safety officers. To provide a complete, up-to-date competency-based curriculum. To fulfill the need for nuclear medicine technologists in the local and regional communities.

**PLACEMENT:** 100% placement of students as Medical physicists and Radiological safety Officers with a starting package of 5-7 lakhs per annum.

**ALUMINI RELATIONS:** Centre for Nuclear Medicine got the first Batch of M.Sc. Nuclear Medicine passed out in 2009. Till now, 13 Batches have passed out after completion of M.Sc. degree. The Alumni are working with nation renowned institutes/hospital viz PGIMER, Chandigarh; AIIMS, New Delhi; AIIMS, Raipur; AIIMS, Rishikesh; CMC, Ludhiana; Oswal, Ludhiana; Tata memorial hospital, Mumbai; Rajiv Gandhi Cancer speciality hospital, Delhi; Baba Farid university, Faridkot; Safdarjung hospital, Delhi; Max hospital, Chandigarh; Forties Hospital, Mohali; Kailash Cancer Hospital And Research Centre, Gujarat etc.

## CENTRE FOR PUBLIC HEALTH

**ABOUT THE CENTRE**

Panjab University is running Master in Public Health since year 2007 under UIEAST to cater with the emerging needs of the country to produce trained manpower for handling public health issues. Public Health is emerging as one of the most significant areas as health of the citizen is important resource and asset of a nation. Major advances in improvement of health over the next decade will be through the development and application of preventive programmes. Health service delivery systems are undergoing rapid changes. It is important to prepare a task force of experts in domain of public health. This course is being offered to prepare Public Health professional and to strengthen capacity of various Health Organization.

**FACULTY**

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Associate Professor | Savita Prashar **(Coordinator)** | Biochemistry |
| Assistant Professor (Temporary) | Manoj Kumar | Public Health |

**COURSES OFFERED (SEMESTER SYSTEM)**

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| Master in Public Health | 17+2NRI + 5 in-service**+1 Foreign National | 2 Years | MBBS / BDS / BAMS / BHMS / B.VSC / B.Sc Nursing, Life Sciences/ Biological Sciences with atleast 50% marks from recognized University / Institutes. | Based on PU-CET (PG) Academics : 50% PU- CET(PG) : 50% |
| Ph.D | Subject to availability | 3-6 Years | See Ph.D Prospectus 2022 | |

* 5% concession is admissible in eligibility marks to SC/ST/BC/PwD candidates
**Only regular employees in Government organization and having at least one year service experience to be admitted under "In-Service" category. The Candidate has to produce "No Objection Certificate" at the time of admission. In case of non-availability of in-service candidates the seats will be converted into General Category.

**TITLES OF SYLLABI :**Detailed syllabus available at http://puchd.ac.in/syllabus.php

**Master in Public Health**

| | Semester I | | Semester II |
|---|---|---|---|
| Paper I | Basic Concepts in Public Health | Paper I | Biostatistics |
| Paper II | Basic Epidemiology-I | Paper II | Occupational Health and Safety Management |
| Paper III | Maternal and Child Health | Paper III | Survey Methods |
| Paper IV | Basic Computing and Research Methodology | Paper IV | Public Health in Emergencies, Disasters and Conflicts |
| Paper V | **Open Elective** – Environmental Health | Paper V | Open Elective - Genetics and Public Health or Global Health |
| Paper VI | Basic Concepts in Life Sciences **OR** Basic Concepts in Social Sciences | | |
| **Semester III** | | **Semester IV** | |
| Paper I | Basic Epidemiology-II | Paper I | Public Health Law, Ethics and Human Rights |
| Paper II | Health Economics and Service Planning | Paper II | Health Education and Counseling |
| Paper III | Health Informatics | Paper III | Dissertation |
| Paper IV | Elective-Health for Special Groups **OR** Public Health in India and World | | |
| Paper V | Internship*/community outreach activities/ Synopsis | | |

**THRUST AREAS**: Health Service, Health Promotions Health Education, Epidemiology, Environmental Health and Nutrition.
**PLACEMENTS**: Off Campus Placement
**ALUMNI RELATIONS**: First Alumni meet was held on 07th May, 2016, 2nd Alumni meet was held on 14th April, 2018 and 3rd Global Alumni meet 2021 of Panjab University was conducted in virtual mode at Centre for Public Health on 22nd January 2021.

## CENTRE FOR STEM CELL & TISSUE ENGINEERING

**ABOUT THE CENTRE**

The centre offers two years (four semesters) M.Sc. degree course in Stem Cell & Tissue Engineering. This course was started in 2008 and is intended for graduate students interested in pursuing their careers in the field of stem cell biology. This course will cover the most current knowledge of the principles of stem cell biology, tissue engineering, developmental biology, molecular signaling, genomic, epigenomic & non-genomic regulatory pathways together with immunology, genetics, human anatomy & physiology.

The course curriculum has been designed to provide strong emphasis on experimental training to the students. During the first three semesters students will be imparted strong theoretical and practical trainings. In the fourth semester students will be trained to handle the research work related to the field. They will also be trained to write the projects, make presentations in the form of seminars and journal clubs along with the training in the Research methodologies. A continuous evaluation will be followed.

**FACULTY**

| Particular | Name | Field of Research Specialization |
|---|---|---|
| Professor | Sanjeev Puri | Renal Tissue Engineering & Molecular Biology of Renal Pathophysiology |
| Assistant Professors | Seemha Rai **(Chairperson)** | Cancer Stem Cells |
| | Anuj Gupta **(Ad-hoc)** | Biochemistry & Cell and Molecular Biology |

**COURSES OFFERED (SEMESTER SYSTEM)**

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| M.Sc. | 15+ 2 NRI | 2 years | Students securing 50% marks in B.Sc. General / Life Sciences / Basic Medical Science / Engineering (Biotech/ Biomedical) / Pharmaceutical Biotechnology / Dentistry / Medical Laboratory Technology are eligible to apply for the admission to M.Sc. in Stem Cell & Tissue Engineering. | Based on PU-CET(PG) Academics: 50% PU-CET(PG):50% |
| Ph.D | Subject to availability | 3-6 years | See Ph.D prospectus 2022. | |
| * 5% concession is admissible in eligibility marks to SC/ST/BC/PwD candidates. | | | | |

**TITLES OF SYLLABI :** Detailed syllabus available at http://puchd.ac.in/syllabus.php

**Master in Public Health**

| Semester I | | Semester II | |
|---|---|---|---|
| I | Human Anatomy and Physiology | VI | Histology |
| II | Cell Culture & Cell Technologies | VII | Immunology & Immunogenetics |
| III | Genomics & Proteomics-I | VIII | Stem Cell Biology-I |
| IV | Cell and Molecular Biology | IX | Genomics & Proteomics-II |
| V | Cell and Molecular Techniques | X | Tissue Engineering-I Biomaterials |
| **Semester III** | | **Semester IV** | |
| XI | Developmental Biology | XVI | Stem Cell Research Methodology |
| XII | Stem Cell Signal Transduction & Epigenetic Mechanisms | XVII | Biostatistics and Computational Approach |
| XIII | Stem Cell Biology-II | XVIII | Journal Club/Seminar |
| XIV | Stem Cell Translational & Ethics | XIX | Thesis/Project reports; *Viva voce* Examination |
| XV | Xenoantigens and Stem Cells | | |

**THRUST AREAS:** Renal Tissue Engineering & Molecular Biology of Renal Pathophysiology, Cancer Stem Cell, Stem Cell differentiation and Niche, Toxicologic studies and kinetics.

**PLACEMENTS:** Students are placed in academia as well as industry. In academia, students are pursuing higher studies at prestigious institutes worldwide *viz.* Rosewell Cancer Institute, State University of New York, Buffalo, USA; Duke University School of Medicine; Univ. of Manchester, UK; Monash Univ. Australia; ICGEB, New Delhi etc. and at industry level students are currently placed at various companies *viz.* Parexel International; Cordlife India, GlaxoSmithKline; MDR Labs *etc*.

**ALUMNI RELATIONS:** Centre for Stem Cell and Tissue Engineering got the first Batch of M.Sc. (Stem Cell and Tissue Engineering) passed out in 2010. Till now Twelve batches have been passed out and two are currently pursuing their M.Sc degree and therefore the Centre has already made an Alumni Association of Stem Cell & Tissue Engineering and a Stem Cell Society. The Centre is keeping an updated information/record about the Alumni placements and is planning to organize Alumni meets/events regular.

## CENTRE FOR SYSTEMS BIOLOGY & BIOINFORMATICS

### ABOUT THE CENTRE

The Centre of Systems Biology & Bioinformatics was established at Panjab University, Chandigarh in 2007. The emerging field of computational and systems biology represents an integration of concepts and ideas from the biological sciences, engineering disciplines, and computer science. Systems modelling and design are well established in engineering disciplines but are relatively new to biology. Advances in computational and systems biology require multidisciplinary teams with skill in applying principles and tools from engineering and computer science to solve problems in biology and medicine. The curriculum of the 2 year M.Sc. course of Systems Biology and Bioinformatics has a strong emphasis on foundational material to encourage students to become creators of future tools and technologies, rather than merely practitioners of current approaches. Areas of active research in this field include computational biology and bioinformatics, gene and protein networks, molecular biophysics, instrumentation engineering, cell and tissue engineering, predictive toxicology and metabolic engineering, imaging and image informatics, nanobiology and Microsystems, biological design and synthetic biology, neurosystems biology and cancer biology. The Centre has also has a Ph.D. Programme and at present five students are pursuing their Ph.Ds.

### FACULTY

| Particulars | Name | Field of Research Specialization |
|---|---|---|
| Associate Professor | Veena Puri | Microarray analysis and AI based Network Biology, PPI Networks. |
| Associate Professors | Tammanna R. Sahrawat **(Chairperson)** | Systems Network Biology Drug poly pharmacology Vector borne diseases. |
| | Ashok Kumar | Cancer Biology and Genomics Network Biology, Data Analytics, Meta Analysis of Cancer Data, National Language Processing, Cohost Studies of Cancer, CADD, Bigdata. |

**COURSES OFFERED (SEMESTER SYSTEM)**

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| M.Sc. | 13+2NRI +1 Foreign National | 2 Years | Bachelor's degree Science (General or Hons.) with Bioinformatics, Biotechnology, Biochemistry, Biology, Botany, Chemistry, Electronics, Genetics, Life Science, Mathematics, Mathematics & Computing, Microbiology, Physics, Statistics, Zoology, Agriculture, Computer Science, Engineering, Medicine, Pharmacy and Veterinary Science with atleast 50% marks | Based on PU-CET(PG) Academics: 50% PU-CET(PG):50% |
| * 5% concession is admissible in eligibility marks to SC/ST/BC/PwD candidates. | | | | |

**TITLE OF SYLLABI :** Detailed syllabus available at http://puchd.ac.in/syllabus.php

**M.Sc.**

| Semester I | | Semester II | |
|---|---|---|---|
| MSBB-101 | Biophysical Chemistry of Biomacromolecules | MSBB-201 | Spectroscopic Methods in Structural Biology |
| MSBB-102 | Metabolomics and Metabolic Pathway Engineering | MSBB-202 | Genomics and Recombinant DNA Technology |
| MSBB-103 | Basic Concepts in Mathematics (For students with Biology Background) | MSBB-203 | Computational Methods of Sequence Analysis and biomacromolecular infomatics |
| MSBB-104 | Basic Concepts in Biology (For students with Non-Biology Background) | MSBB-204 | Programming in C++ and PERL |
| MSBB-105 | Biostatistics | Practical-210 | Based on MSBB 201 |
| MSBB-106 | Data Management and Biological Databases | Practical-220 | Based on MSBB 202 |
| Practical-110 | Based on MSBB 101 | Practical-230 | Based on MSBB 203 |
| Practical-120 | Based on MSBB 102 | Practical-240 | Based on MSBB 204 |
| Practical-150 | Based on MSBB 105 | Seminar | On (i) (a) Data Bases and Bioinformatics tools on the internet (b) Modeling tools-visualization and genome matrix (c) solving of structures using different softwares (ii) Journal Club |
| **Semester III** | | **Semester IV** | |
| MSBB 301 | Computation Cell Biology I | MSBB 401 | Computation Cell Biology II |
| MSBB 302 | Systems Biology | MSBB 402 | Chemoinformatics |
| MSBB 303 | Proteomics and Systems Biology | MSBB 403 | Advance Bioinformatics and Nanotechnology |
| MSBB 304 | Molecular Modeling and Computer aided Drug Design | | Project Work and Oral Presentation |
| Practical 310 | Based on MSBB 301 | | |
| Practical 320 | Based on MSBB 302 | | |
| Practical 330 | Based on MSBB 303 | | |
| Practical 340 | Based on MSBB 304 | | |
| Seminar | On (i) (a) AMBER & Molecular dynamics, (b) E-cell (c) Pybio-S (d) System Biology bench works (ii) Journal Club | | |

**THRUST AREAS:** (I) Bioinformatics (ii) Cancer Biology and Genomics (iii) Symbiomic & Network Biology (iv) Microarray Analysis (v) NLP and Data analytics (vi) Structural Biology (vii) Meta Analysis (viii) Vector Borne Diseases.

**PLACEMENTS**: The Centre has its own placement cell and we approach different companies for placements of our students. PG students get placement in clinical Research Organization and Pharmaceutical companies like Parexel, Panacea Biotech etc as well as pursing Ph.D programme from the Centre as well as from the National Institutes like IMTECH, PGIMER, NIPER, IIT, IISER & IIIT followed by Post doc and Faculty positions in National and International Institutes.

**ALUMNI RELATIONS**: The Centre of Systems Biology & Bioinformatics was established at Panjab University, Chandigarh in 2007 with a strong alumni base. We have regular interactions amongst the present batches and alumni.

## DEPARTMENT OF ZOOLOGY

**ABOUT THE DEPARTMENT:**

The Department of Zoology was established at Lahore in 1906 and later shifted first to Hoshiarpur after the partition of country and then to Chandigarh in July 1960. The department is running choice based courses system (CBCS) in both UG and PG classes. The department provides excellent opportunities to students who can acquire training and degree in Zoology through B.Sc. (Honours), M.Sc. (Honours) and Ph.D programme. The department has been organizing, seminars, symposia, workshops, field trips and other extra-curricular activities from time to time for overall development of the young students.

The Department was awarded Centre of Advanced Studies (CAS-I) by the UGC from April 2007 to April 2012 under the thrust area of Biodiversity: Cell and Molecular Biology with a grant of Rs. 78.25 lacs. The UGC upgraded the department in 2015 to the level of CAS-II for five years with a financial assistance of Rs. 161.55 lacs and two research fellows. The Department was also re-cognised by the Department of Science and Technology in 2013 under its FIST programme and sanctioned a grant of 1.10 crores for 5 years. With this grant a flow cytometry laboratory was established with the most sophisticated LSR Fortessa Cell Analyzer.

The Department is running research projects worth Rs. is ~3.41 crore, funded by different agencies like CCRH, DST (SERB), DBT and UGC. The Department has received grant of 20 Lacs from RUSA for developing skill enhancement courses in Zoology. The department has central sophisticated laboratories well equipped with scientific instruments such as Real Time PCR, 2D Gel Electrophoresis, Ultracentrifuge, HPLC etc.

Some of the major areas of research of the faculty members are Parasitology, Parasitic therapeutics, Cytogenetics, Human genetics, Stem cell therapy, Molecular biology, Immunology, Environmental Toxicology, Systematic Entomology, Applied Entomology, Molecular Genomics, Reproductive Physiology. Aquatic Biology, Wetland Ecology, Fish and Fisheries, Fish Neurotoxicology and Fish Biomaterials.

The Department library is stocked with highly informative text and reference books in addition to national and international journals. The Department houses two state of the art museums having more than 5000 specimens covering the whole Animal Kingdom. The museum boasts of an extensive collection of skeletons, mounted animals and specimens preserved in formalin. The museum is well curated with maintained stock registers listing the scheduled and non-scheduled animals as defined under wildlife (Protection) Act, 1972. The department is running two skill enhancement course in Apiculture and Aquarium Fish Keeping to encourage the students self-employment potential of Applied Zoology.

The Department arranges Educational tour to National Park/ Biodiversity Park/Wild Life Sanctuary/Wetland/Zoo etc. every year for B.Sc. (Honours) students in order to acquaint them with animal diversity.

## FACULTY:

| Particulars | Name | Field of Research Specialization |
|---|---|---|
| Professors | Sukhbir Kaur | Parasitology, Immunology |
| | Harpreet Kaur | Parasitology |
| Assistant Professors | Y.K. Rawal **(Chairperson)** | Fish and Fisheries |
| | Archana Chauhan | Molecular Biology, Genomics, Ecology |
| | Ravinder Kumar | Molecular Skin Biology, Stem Cell |
| | Ravneet Kaur | Fish Neurotoxicology & Fish Biomaterials, Wetland Ecology |
| | Mani Chopra | Cytogenetics, Cell- Biology, Molecular toxicology |
| | Indu Sharma | Reproductive Physiology, Molecular Biology |
| | Vijay Kumar | Human Genetics, Molecular Biology |
| DST INSPIRE Faculty | Ranjana Jaiswara | Entomology |

## COURSES OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. (Honours) | 25+4 NRI+ 1 Foreign National | 3 years | Passed 10+2 examination with at least 50% marks with Physics, Chemistry, Biology and English. | Based on CET (UG)<br>PU CET UG – 75%<br>Academics – 25% |
| M. Sc. (Honours) | 14+2 NRI + 1 Foreign National | 2 years | B Sc. (Pass or Hons.) with 50% marks in the examination of P.U. or any other examination recognized by P.U. as equivalent thereto with Zoology as one of the elective subject | Based on CET (PG)<br>PU-CET PG – 60%<br>Academics – 40% |
| Ph. D. | Subject to availability | 3-6 years | See Ph.D prospectus 2022 | |
| *5% Concession in admissible in eligibility marks to SC/ST/BC/PwD Candidates. | | | | |

**TITLES OF SYLLABI:** Detailed course curriculum is available at https://puchd.ac.in/syllabus

**B.Sc. (Honours)** Choice Based Credit System (CBCS) under the framework of Honours School System

| SEMESTER I | SEMESTER II |
|---|---|
| BZO-C1: Non-Chordates I: Protista to Pseudocoelomates | BZO-C3: Non-Chordates II: Coelomates |
| BZO-C2: Principles of Ecology | BZO-C4: Cell Biology |
| BZO-AECC1: English | BZO: AECC2: Environmental Science |
| BZO-C-GE1: Animal Diversity | BZO-C-GE2: Human Physiology |
| **SEMESTER III** | **SEMESTER IV** |
| BZO-C5: Diversity of Chordates | BZO-C8: Comparative Anatomy of Vertebrates |
| BZO-C6: Physiology: Controlling and Coordinating Systems | BZO-C9: Physiology: Life Sustaining Systems |
| BZO-C7: Fundamentals of Biochemistry | BZO-C10: Biochemistry of Metabolic Processes |
| SEC* | SEC* |
| BZO-C-GE3: Insect Vector and Diseases | BZO-C-GE4: Aquatic Biology |
| **SEMESTER V** | **SEMESTER VI** |
| BZO-C11: Molecular Biology | BZO-C13: Developmental Biology |
| BZO-C12: Principles of Genetics | BZO-C14: Evolutionary Biology |
| DSE** | DSE** |
| DSE** | DSE** |

**C: Core Courses; GE: General Elective; AECC: Ability Enhancement Compulsory Courses; SEC: Skill Enhancement Courses; DSE: Discipline Specific Elective**

***SKILL ENHANCEMENT COURSES (any one per semester in semesters 3-4)**

1. BZO-SEC1: Apiculture
2. BZO-SEC2: Aquarium Fish Keeping

3. BZO-SEC3: Medical Diagnostics
4. BZO-SEC4: Research Methodology

****DISCIPLINE SPECIFIC ELECTIVE COURSES (any two per semester in semesters 5-6)**

5. BZO-DSE1: Endocrinology
6. BZO-DSE2: Reproductive Biology
7. BZO-DSE3: Wild Life Conservation and Management
8. BZO-DSE4: Animal Biotechnology
9. BZO-DSE5: Fish and Fisheries
10. BZO-DSE6: Parasitology
11. BZO-DSE7: Immunology
12. BZO-DSE8: Biology of Insecta

**GENERAL ELECTIVE SUBJECTS (Offered by Zoology Department) for students of other departments**

| Code | Generic Elective Subject | Pre-requisite |
|---|---|---|
| BZO-C-GE1: | Animal Diversity | 10+2 Biology |
| BZO-C-GE2 | Human Physiology | 10+2 Biology |
| BZO-C-GE3 | Insect Vector and Diseases | 10+2 Biology |
| BZO-C-GE4 | Aquatic Biology | 10+2 Biology |

**Note: A Department will run a particular Skill Enhancement Course, Discipline Specific Elective Course and General Elective Course only if the minimum number of students opting for that course is 10**
**Outlines for Semester II will be same as for Semester I**

**M.Sc.(Honours)**

Choice Based Credit System (CBCS) under the framework of Honours School System

| SEMESTER I | | SEMESTER II | |
|---|---|---|---|
| MZO-MC1 | Advanced Cell Biology | MZO-MC5 | Biology of Vertebrate Immune System |
| MZO-MC2 | Aquaculture & Fisheries | MZO-MC6 | Methods and applications of Molecular Biology |
| MZO-MC3 | Insect Ecology and Physiology | MZO-MC7 | Environmental and Quantitative Biology |
| MZO-MC4 | Biology of Parasites | MZO-MC8 | Methodology and Instrumentation |
| **SEMESTER III** | | **SEMESTER IV** | |
| MZO-MC9 | Animal Physiology | MZO-ME* | Elective -1* |
| MZO-MC10 | Developmental Biology | MZO-ME** | Elective -2** |
| MZO-MC11 | Animal Biochemistry | | Project Report/Dissertation -Major |
| | Project Report/Dissertation -Minor | | |

*** Elective 1 will be selected from the options given below:**

| | |
|---|---|
| MZO-ME1. | Concepts of Parasitology |
| MZO-ME2. | Economic Entomology |
| MZO-ME3. | Molecular Cytogenetics |
| MZO-ME4. | Molecular Endocrinology and Reproductive Physiology |
| MZO-ME5. | Fish, Fisheries and Aquatic Biology |

**** Elective 2 will be selected from the options given below:**

| | |
|---|---|
| MZO-ME6. | Animal Cell Culture and its Applications |
| MZO-ME7. | Biosystematics and Introduction to Bioinformatics |
| MZO-ME8. | Concepts in Human Genetics and Related Disorders |
| MZO-ME9. | Metabolic Disorders |
| MZO-ME10. | Biomaterials and Nanobiology |

**THRUST AREAS**: Fish & Fisheries, Cell & Molecular Biology, Entomology, Parasitology and Reproductive Physiology.

**PLACEMENTS**: At present the department is coordinating with the Central Placement Cell, Panjab University for placement of students of the department. However, the department is exploring the possibilities for placement of students at graduate, post graduate and post-doctoral levels.

**ALUMNI RELATIONS**: The department also has an Alumni Association and a Zoological Society. Alumni from this department occupy important positions in academic and administrative areas. The faculty and students are members of the society which caters to academic and extra-curricular needs of its members.

## UNIVERSITY INSTITUTE OF FASHION TECHNOLOGY AND VOCATIONAL DEVELOPMENT

### ABOUT THE INSTITUTE

University Institute of Fashion Technology and Vocational Development (UIFT&VD) is an in-Campus Institute, established by the Panjab University, Chandigarh in 2007 as a commitment to carry forward its goal of providing trained professionals for the fast growing fashion, apparel, and textile industry in the region in particular and the country in general. UIFT&VD offers a prestigious Five Year Integrated B.Sc. & M.Sc. Degree in Fashion and Lifestyle Technology. The program laid out in a semester system focuses on self-sustaining education and training in fashion and lifestyle technology. First three years of the course comprise of Foundation and Core Studies of which sixth semester entails Industrial Training with an option to undertake an Industry or a Design Project. The students are awarded a B.Sc. Degree in Fashion & Lifestyle Technology on the completion of the course. With showcasing a Design Collection and having an insight of the Retail Business of Branded Fashion the course prepares the students for decent earning and self-employment.

Two years spent in M.Sc. Fashion & Lifestyle Technology have the students take up across the country visits for Craft Documentation. They undergo extensive specialized research followed by seminars and presentations. An intensive study of Organization and Management Skills required to run a Fashion and Lifestyle Business further prepares the students to find their niche' in the work sphere.

Highly trained and experienced faculty is involved in giving thorough theoretical and practical knowledge inputs to the students. This, along with assistance rendered to lead the students in task based studies helps the young learners to hone their talent to face the challenging requirements of the Fashion Industry.

To move into the global mainstream of intense economic competition and to reckon with requirement of the Fashion Industry of India in totality, the Department liaises with fashion related organizations for guiding the students in handling latest technology. There is regular interaction with experts at Design Studios, Production Houses, Distribution Centres and Retail Establishments as well as the Industry to form a vital bridge between University Institute of Fashion Technology and the larger community. Through an MOU with Nottingham Trent University, U.K. a series of exchanges have begun, giving rise to cross cultural teaching and learning process.

The department offers state of the art equipment for hands on experience of the students. A proposed Resource Centre and an Amphitheatre shall take the Institute to the next level in terms of infrastructural facilities.

## FACULTY

| Designation | Name | Field of Research Specialization |
|---|---|---|
| Assistant Professors | Anu H. Gupta **(Chairperson)** | Clothing & Textiles |
| | Prabhdip Brar | Apparel Design, Art History & Fine Arts |
| | Rita Kant | Clothing & Textiles |

## COURSE OFFERED (SEMESTER SYSTEM)

| Course | Seats | Duration | Eligibility* | Admission Criteria |
|---|---|---|---|---|
| B.Sc. | 46 + 6 NRI + 2 Foreign National | 3 Years | Passed 10+2 Examination with atleast 50% marks in aggregate from CBSE or any other recognized Board. | Based on Aptitude Test**<br>Aptitude Test: 60%<br>Academics: 20%<br>Preference Criteria: 10%<br>Interview: 10% |
| M.Sc. | 46 + 6 NRI + 2 Foreign National | 2 Years | Passed B.Sc. Fashion & Lifestyle Technology from UIFT, PU.<br>**Lateral Entry:** Lateral Entry will be allowed in case any seats are left vacant. Eligibility is as under:-<br>Passed B.Sc. (Fashion Designing) examination with at least 50% marks in aggregate from PU, or an examination from any other university recognized as equivalent thereto. | Based on Aptitude Test***<br>Aptitude Test: 45%<br>Academics: 40%<br>Group Discussion: 05%<br>Interview: 10% |
| Ph.D | Subject to availability | 3-5 years | See Ph.D Prospectus 2022 | As per UGC/P.U. norms |

* 5% concession admissible in eligibility marks to SC/ST/BC/PwD candidates.

** **For B.Sc**.: Aptitude test will comprise of **(a) General Ability Test** : There will be a written test for analytical reasoning, quantitative aptitude, communication skills in English, General Knowledge and current affairs. **(b) Creative Ability Test:** There will be a practical test of creative skill, freehand drawing, sketching and development of a 3D model for any given theme (material list will be provided in advance so that the candidate can bring their own material for the test). Candidates who have studied Fashion Design / Fine arts subjects in 10+2 will be given 10% weightage in the total marks scored. Candidate must score at least 50% marks in aggregate (Academics exam + Aptitude test + Preference Criteria + Interview).

*** **For M.Sc.**: Aptitude test will comprise of **written test** to evaluate general ability and subject knowledge and **practical test** to evaluate creative ability. **Creative ability test**: Material list will be provided in advance so that the candidates can bring their own material for the test. Group Discussion will be on the topics related to Fashion and Lifestyle Technology.
Candidate must score at least 50% marks in aggregate (Academics + Aptitude test + Preference Criteria + Interview+ Group Discussion).

**TITLES OF SYLLABI :** Detailed syllabus available at http://puchd.ac.in/syllabus.php

**B.Sc**

| Semester-I | | Semester –II | |
|---|---|---|---|
| Paper-1 | English-I (Th.) | Paper-1 | English-II (Pr.) |
| Paper -2 | Visual Design -I (Pr.) | Paper -2 | Fabric Technology-II (Th.) |
| Paper -3 | Fine Art & Fashion Illustration-I (Pr.) | Paper -3 | Fine Art & Fashion Illustration -II (Practical) |
| Paper -4 | Introduction to Sewing Techniques (Pr.) | Paper -4 | Visual Design -II (Pr.) |
| Paper -5 | Fabric Technology-I (Th.) | Paper -5 | Pattern Development-I (Pr.) |
| Paper -6 | Creative Techniques (Pr.) | Paper -6 | Fabric Handling (Pr.) |
| Paper -7 | Fashion Studies-I (Th.) | Paper -7 | Sewing Techniques (Pr.) |
| Paper -8 | Computer Graphics-I (Pr.) | Paper - 8 | Computer Graphics-II (Pr.) |
| | Lifestyle Management -I/Tutorial | | Lifestyle Management II/Tutorial |
| **Semester-III** | | **Semester-IV** | |
| Paper-1 | English-III (Th.) | Paper-1 | English-IV (Th.) |
| Paper -2 | History of Indian Costumes (Th.) | Paper -2 | Fashion Merchandizing and Retail Management (Th.) |
| Paper -3 | Fabric Technology –III (Th.) | Paper -3 | Traditional Indian Textiles and Embroideries (Pr.) |
| Paper -4 | Project Based Fashion Studies (Pr.) | Paper -4 | Fabric Technology-IV (Pr.) |
| Paper -5 | Design Process –I (Pr.) | Paper -5 | Design Process II (Pr.) |

| | | | |
|---|---|---|---|
| Paper -6 | Fine Art & Fashion Illustration –III (Pr.) | Paper -6 | Fine Art & Fashion Illustration IV (Pr.) |
| Paper -7 | Advance Pattern Development (Pr.) | Paper -7 | Advanced Pattern Development and Draping (Pr.) |
| Paper 8 | Garment Construction Technology –I (Pr.) | Paper 8 | Garment Construction Technology II (Pr.) |
| Paper 9 | Computer Graphics –III (Pr.) | Paper 9 | Computer Graphics IV (Pr.) |
| | Lifestyle Management III/Tutorial | | Lifestyle Management IV/Tutorial |
| **Semester-V** | | **Semester-VI** | |
| Paper-1 | English-V (Th.) | Paper-1 | English-VI (Th.) |
| Paper -2 | Fundamentals of Marketing (Th.) | Paper -2 | Fashion Merchandising & Retail Management (Th.) |
| Paper -3 | Fashion Journalism (Th.) | Paper -3 | Personality & Clothing (Th.) |
| Paper -4 | Basics of Research and Statistics (Th.) | Paper -4 | Fine Art & Fashion Illustration for Design Collection VI (Pr.)<br>I. Design Development (Pr.)<br>II. Pattern Development (Pr.)<br>III. Product Development (Pr.) |
| Paper -5 | Basics of Weaving Technology (Pr.) | Paper -5 | Computer Graphics VI (Pr.) |
| Paper -6 | Basics of Knitting Technology (Pr.) | Paper -6 | Fashion Photography (Pr.) |
| Paper -7 | Fine Art & Fashion Illustration V (Pr.) | Paper -7 | Portfolio Making (Pr.) |
| Paper -8 | Pattern Development IV (Pr.) | Paper- 8 | In plant Training Project & Seminar |
| Paper- 9 | Commercial Clothing I (Pr.) | | Lifestyle Management VI/Tutorial |
| Paper- 10 | Computer Graphics V (Pr.) | | |
| | Lifestyle Management V/Tutorial | | |

**M.Sc.**

| **Semester-I** | | **Semester-II** | |
|---|---|---|---|
| Paper-1 | Fashion Retail Management- I (Th.) | Paper-1 | Fashion Retail Management- II (Th.) |
| Paper -2 | Research Methodology in Fashion & Lifestyle Technology-I(Th.) | Paper -2 | Research Methodology in Fashion & Lifestyle Technology-II (Th.) |
| Paper -3 | Statistical Techniques in Fashion & Lifestyle Technology-I (Th.) | Paper -3 | Statistical Techniques in Fashion & Lifestyle Technology-II (Th.) |
| Paper -4 | Textile Testing (Th.) | Paper -4 | Textile Chemistry (Th.) |
| Paper -5 | Textile Testing (Pr.) | Paper -5 | Textile Chemistry (Pr.) |
| Paper -6 | CAD Fashion Studio-I (Pr.) | Paper -6 | CAD Fashion Studio-II (Pr.) |
| Paper -7 | *Apparel Core (kids wear) (Pr.)<br>• Design Development<br>• Pattern Development<br>• Product Development | Paper -7 | *Apparel Core (Women's wear) (Pr.)<br>• Design Development<br>• Pattern Development<br>• Product Development |
| Paper -8 | Craft Survey & Documentation (Pr.) | Paper -8 | Dissertation Seminar – II<br>Research: Development of Tool for Pilot Study; Selection of Sample, Research Design and Data Collection.<br>Product: Development of Tool to Test Proof of Product Concept, Prototype Development, Alpha testing, Research Design and Data Collection. |
| Paper -9 | Dissertation Seminar-I<br>Presenting Proof of Concept; Review of Literature; Broad question of enquiry as reflected in the Title of proposed Research or Project. | | Lifestyle Management VIII/Tutorial |
| | Lifestyle Management VII/Tutorial | | |
| **Semester-III** | | **Semester-IV** | |
| Paper-1 | Industrial Management (Th.) | Paper-1 | Entrepreneurship Development (Th.) |
| Paper -2 | Quality Management (Th.) | Paper -2 | Development of High Fashion Structured Garments (Pr.) |
| Paper -3 | CAD Fashion Studio-III (Pr.) | Paper -3 | Port Folio Development (Pr.) |
| Paper -4 | **Apparel Core (Men's Wear) (Pr.)<br>• Design Development<br>• Pattern Development<br>• Product Development | Paper -4 | Technical Advances in Textile Material (Th.) |
| Paper -5 | Dissertation Seminar – III<br>Research: Final Data Collection, Scoring and Analysis of Data thru SPSS or any suitable Software.<br>Product: Final Data Collection and Beta testing for acceptability of Product; | Paper -5 | Research: Submission of Research Document, Presentation and Viva<br>Product: Submission of Documented Product Development Process, Presentation and Exhibition of Product/Products with Viva. |

| | | | |
|---|---|---|---|
| | Proposed steps of Product promotion and Product launch. | | |
| | Lifestyle Management IX/Tutorial | | Lifestyle Management X/Tutorial |

**THRUST AREAS:** Product & Line Development, Fashion Design, Illustration, Traditional Textile Embroidery, Research Projects, Fashion Event Management, Surface Design, CAD, Textile Technology, Visual Merchandizing, Fashion Forecasting and Media Reporting**.**

**PLACEMENTS:** The Department continues to support students by arranging for on-campus and off-campus placements in reputed organizations. Many students opt for self-employment and spring up as successful entrepreneurs. The students who opt for placements are helped in securing good jobs in different organizations of their own choices.

**ALUMNI RELATION:** Alumni from this department have been suitably employed in academics, industry and many have been able to establish themselves as successful entrepreneurs. They are regularly supporting the department in terms of lectures and suggestions from their industrial experience. Many of them visit the department and address students in order to prepare them for their future and help in arranging industrial exposure, training and placements. A face book page supports the activities of the department where alumini are also members.