

Faculty of Science

Thrust areas of research in the Faculty of Science are environment and health. The research objective is to understand the etiology of diseases at molecular level and inter-relationship between nutrients and drugs. Modern bio-medical research tools and developments in the fields of Genetic Engineering, Genomics, Proteomics and Bio-informatics are being used to understand the cellular processes associated with health and diseases. The emerging concept of role of elements in health, effect of chemicals on environment, health and ecosystem including mitigation of their toxicity and carcinogenicity are other areas of research. Scientific evaluation of the efficacy of herbal medicine is being extensively pursued. The effect of environment on growth, structure and chemistry of plants, relationship between structure and function of proteins and enzymes, development of bio-molecules by r-DNA technology, regulation of gene expression, development of new generation vaccines and diagnostic probes, enhancement of secondary metabolites in medicinal plants, metabolomics, molecular biology of diseases, biotransformation of medicinal plants for better yield of medicinal compounds and transgenics of valuable crops and medicinal plants are also being studied.

The Faculty of Science also maintains the following facilities:

1. Central Instrumentation Facility
2. Central Animal House Facility
3. Herbal Garden
4. Transgenic Containment Facility

Departments, programmes and selection procedure

Faculty of Science consists of the following departments and centers which offer various programs of study:

- Department of Biochemistry
- Department of Biotechnology
- Department of Botany
- Department of Chemistry
- Centre for Clinical and Translational Research
- Department of Medical Elementology and Toxicology

Department of Biochemistry

Biochemistry is the molecular logic of living system. It finds applications in diverse disciplines such as medical and agricultural sciences, environmental sciences, forestry, dietetics, food science and technology, hormone production, vaccine research, virology, immunology, microbiology, toxicology and in areas from marine biology to entomology, not just to carry out the R&D work and develop new products, but also to monitor the production, quality and safety of the product. Biochemists provide diagnostic service, carrying out tests on blood, urine and other body fluids, while researching the underlying causes of disease and methods of treatment, and have opportunities to work in hospitals, pharmaceutical industry and agrochemical companies, food brewing and biotechnology. The postgraduate degree in Biochemistry also enables students to teach in universities and colleges as well as the medical, dental and veterinary schools and consulting or allied work. The Department offers MSc and PhD programs in Biochemistry and over the years has gained reputation of being a center of quality education and training in Biochemistry both in India and abroad. The Department has been awarded UGC SAP and DST FIST, in addition to a number of grants from various sources including a DBT grant for creating Bioinformatics Infrastructure Facility. The Department has also successfully completed a UNICEF sponsored ICMR task force study, and several other schemes supported by CSIR, DST, DBT, ICMR, CCRUM and UGC.

Thrust areas include:

- Chronic Inflammatory Disorders; Cell Death
- Cancer etiology; Nutrigenomics
- Proteomics
- Natural antioxidants in diabetic complications
- Molecular immunology; Insulin resistance

Over the years, the Department has developed facilities for high precision analytical work and has acquired sophisticated equipments and tools for cellular and molecular research including the facility to work on cell lines. The Department regularly organizes seminars, workshops, brain-storming and interactive sessions for the students, besides providing training to students and staff from other institutes, universities and colleges. The faculty actively participates in international and national conferences, seminars, workshops, meetings, orientation and refresher courses, and is on the panel of experts in various academic and nonacademic bodies. The Syllabus is updated regularly and promoting emerging areas such as computational and systems biology, nanotechnology. Students are encouraged for creative learning and to deliver lectures/debates on topics of current interest in biological sciences. Students have high rate of success in various competitive examinations and many of them are working in premier institutes and companies in India and abroad. About 200 students of the department have qualified various national level tests since its inception in 1994. Students are working as scientist and academicians in government setups including DRDO, CSIR and Indian universities, besides taking up jobs in private sectors.

MSc Biochemistry

Duration: Two years (Four semesters)
Seats: 25 (20* General Category + 05 SFS Category)
Eligibility: The candidate must have

- Passed B.Sc in Bio-chemistry or equivalent examination in Biological sciences with Bio-chemistry or Chemistry as one of the subjects securing at least 45% marks in aggregate.
- Appeared in the Entrance Test conducted by Jamia Hamdard.

Department of Biotechnology

The Department is 4th top Biotechnology Schools of India as per survey made by Bio Spectrum (2013). It is supported by FIST (DST, Govt. of India) and SAP (UGC). The Department offers two formal programmes of study: a two year post-graduate course leading to M.Sc. in Biotechnology and doctoral research leading to PhD degree. Besides, it also offers opportunity for post-doctoral research. The faculty members of the Department have been able to attract number of extramurally funded research projects from various funding agencies such as DBT, DST, CSIR, ICAR, ICMR, DRDO, UGC, DOEn, ISM&H, CCRUM, AYUSH and World Bank. M.Sc. Part II students are allowed to do an intensive project work with teachers of the faculty covering literature survey, experimentation (wet lab), data generation, writing and presentation skill.

The current research interest of the faculty members include: development of biomolecules by r-DNA technology, regulation of gene expression, Development of diagnostic tests, molecular virology; human viruses, vaccine development, genomics/proteomics of cancers and development of biomarkers for their early detection, Molecular biology of non-infectious diseases, proteomics of host-pathogen interactions, enhancement of secondary metabolites through genetic engineering and *in vitro* culture, metabolic engineering of medicinal plants for better yields of medicinal compounds, *in vivo* and *in vitro* conservation of medicinal plants and transgenics of vegetables, floriculture and oil crops

The Department has inter-institutional collaboration with ICGEB (New Delhi), AIIMS (New Delhi), NII (New Delhi), Dabur Research Foundation (Ghaziabad), National Institute of Communicable Diseases (New Delhi), National Centre for Biological Sciences (Bangalore), CDRI (Lucknow), TERI (New Delhi), IARI (New Delhi), JNU (New Delhi), University of Delhi South Campus (New Delhi), Institute of Genomics and Integrative Biology (New Delhi), CDFD (Hyderabad), CDRI, IITRC (Lucknow), IIIM (Jammu), DRDO (New Delhi), Talwar Research Foundation (New Delhi), THSTI (Faridabad), NIGPR to name a few.

The students of biotechnology have high rate of success in NET/GATE/ ICMR/ DBT test for JRF. They have been selected in reputed institutions such as JMI, Delhi University, CCMB, CDFD, AIIMS, IISc, ICGEB, NII, NCCS, NCBS etc., besides placements abroad.

Recently the Department has developed international research programs (Indo-US Vaccine action program) with the Emory University, USA and Centre for Disease Control (CDC), USA on infectious diseases.

Centre for Transgenic Plant Development

The Centre is a unit of Department of Biotechnology. It is equipped with the state of the art facilities to train PhD and post doctoral students and to carry out research in various disciplines of plant and microbial biotechnology. The major R & D activities being pursued include cloning and characterization of novel genes linked with tolerance to biotic and abiotic stresses and quality traits of medicinal and crop plants, authentication and standardization of crude components of herbal formulations and nano vehicle assisted gene delivery in plants. The thrust areas of centre also include improving the quality of medicinal crops through genetic engineering of metabolic pathway; *miRNA* and *RNAi* approaches conservation of medicinal plants; developments of easy, rapid, sensitive, cost effective method for aflatoxigenic mould detection in the groundnut kernels and soil and identification and quantification of aflatoxins in the food and feed. The centre has received grants from government agencies such as DST, DBT, Department of AYUSH, CCRUM, CSIR, ICMR, DRDO etc. for R & D projects carried out at the Centre. The consultancy projects from biotech companies are also carried out in the centre.

MSc Biotechnology

- Duration:** Two years (4 Semesters)
Seats: 40 (20* General category + 20 SFS) – Seats include the seats for NRI/sponsored category candidates
Eligibility: A candidate must have
- Passed B.Sc. examination from a recognized University in Biological Sciences with a minimum of 45% marks in aggregate. The candidates having passed B.Sc. (Agriculture) or BVSc are also eligible.
 - Appeared in the Entrance Test conducted by Jamia Hamdard.

Selection procedure: An Entrance Test will be conducted to test the knowledge of the candidates in Zoology, Botany, Chemistry, Biochemistry and Molecular Biology at B.Sc. level. The selection will be made on the basis of merit determined by the performance of the candidates in the Entrance Test.

For admission against the Foreign National/ NRI/Sponsored seats, written test is not required.

Department of Botany

The Department of Botany, which came into existence in the year 1989, has developed strong research programmes in the fields of stress physiology, structural & developmental botany, environmental botany, systematics, medicobotany, plant biotechnology and molecular biology. The first registration for Ph.D. was done in 1991. The post-graduate teaching programme started in 1994 leading to the award of M.Sc. degree. The first Ph.D. degree in Botany was awarded in 1995 and the first batch of students got M.Sc. degrees in 1996. So far 19 batches have successfully passed out from this department. A Post-graduate Diploma in Environmental Monitoring and Impact Assessment is also run by the department through distance mode of learning.

During the last 26 years as many as 90 students have been the recipients of Ph.D. degree. Alumni of the department have distinguished as teachers and scientists occupying important position in Indian universities, research institutions, colleges and non-governmental organizations. The department has been acknowledged for its excellence and creativity by various agencies of National/ International repute.

Thrust areas of research

- Plant response to heavy metal and environmental stresses
- Air pollution impact on plant form, function and medicinal properties
- Characterization of medicinal plants
- Ethnobotany and plant systematic
- Meristematic behavior and radial growth in plants
- Tissue culture studies for alkaloid production, clonal multiplication and preservation of endangered species
- Proteomics of nitrogen-efficient and nitrogen-inefficient rice and wheat
- Development of nanosensors for measurement of in vivo flux of metabolites

Research Facilities

The Department has well equipped laboratories for research. The available equipments include Growth chambers, BOD incubators, Refrigerated microfuges, Laminar air flow, Shakers, Environmental shaker incubator, Double beam spectrophotometer, PCR, High speed cold centrifuge, Deep freezer (-20, -80,°C), IRGA (Photosynthesis System), Leaf area meters, Flame photometer, Sliding and rotary microtomes, Gel documentation system and Nikon's Phase contrast microscope with photography attachment, Weather station attached with gas monitoring sensors, Spectrophotometers, Chlorophyll Fluorometer, Plant Canopy Analyzer, Rotavapor, Sound level meter, Gas & dust analysing system and Inverted fluorescent microscope. A modest Green House and an environmentally controlled Glass House is also available.

Twenty three research projects from different funding agencies are successfully completed/going on in the department.

The University Grants Commission has granted assistance to the Department of Botany, Jamia Hamdard at the level of DRS-1 for 5 years 2011-2016 under the Special Assistance Programme (SAP).

MSc Botany

Duration: Two years (Four semesters)

Seats: 30 (25 General + 05 SFS)

Eligibility: A candidate must have

- Passed BSc or equivalent examination of a recognized university with Botany/Plant Sciences as one of the subjects securing at least 45% marks in the aggregate.
- Appeared in the Entrance Test conducted by Jamia Hamdard.

Centre for Clinical and Translational Research

The Centre was established as a Department of Clinical Research in the year 2009 with an objective to train human resources in clinical research. In the year 2012 it was transformed into a Centre and scope of its activities was also expanded by including component of translational research. The Centre envisages imparting theory and practical training in all aspects of clinical research and clinical trails. It provides opportunity to young aspirants desirous of pursuing a career in expanding healthcare sector in India and abroad. According to industry sources, the clinical research industry in India will require a large number of professionals trained in various aspects of clinical research in the coming years. Importance of clinical research has got recognition in recent years due to commendable growth in domestic pharma industry. Global pharma giants have shown interest to conduct clinical trials in India. Moreover, a number of contract research organisations (CROs) has been set up in India. In view of all this developments demand for clinical research professionals in India is expected to grow exponentially. Therefore, personnel involved in clinical research needs training in Good Clinical Practices (GCP) and ethics.

The Centre offers a four semester full-time M.Sc. programme in Clinical Research which takes care of all aspects of clinical research. The study programme is comprehensive based on both course work and hands-on research experience in leading clinical research organization. It is a broad-based multi-disciplinary study programme to prepare professionals in clinical research with training in the principles and methods of clinical research, clinical trials, epidemiology, health economics, biostatistics, bioethics, GCP, translational research and application of these principles to clinical trails.

The Centre has established collaboration with Sun Pharmaceuticals Ltd. , Max Health Care Institute Ltd. INCLIN Trust International, Apollo Hospitals Educational and Research Foundation and other leading clinical research organizations for practical and hands-on training of the students. The Centre also envisages to organize communication skills workshop, and regular seminars for the students to train them in writing and presenting research data, clinical reports, grant applications and case study reports. Students are also provided exposure to Instructional Review Board (IRB) meetings.

Placement opportunities for M.Sc. Clinical Research students are very bright. Passed out students have been placed in Novartis, Panacea Biotech, Troikaa Pharmaceuticals, Fortis, Jubilant, Indgene, Auriga, Max Neemam, Max Healthcare Institute Ltd., SRL-Sun Pharmaceuticals Ltd., Relegare, Totipotent, Baxter, Sir Gangram Hospital, Escort Health Institute, Medanta Pushpawati Singhanian Research Institute (PSRI), Translational Health Science and Technology Institute (THSTI, DBT), Jamia Hamdard (in Ph.D programme), and BIT, Mesra (in Ph.D programme). Centre regularly organizes workshops on the contemporary topics in Clinical Research. Centre also undertakes consultancy projects on clinical trials.

MSc Clinical Research

- Duration:** Two years (Four Semesters)
Seats: 25 (inclusive of seats reserved for NRI/Sponsored candidates); additional seats are available for Foreign Nationals.
Eligibility: Candidates with any of the following qualifications from a university recognized by Jamia Hamdard, with at least 45% marks in aggregate, shall be eligible for admission to this programme:
- MBBS / BDS / BAMS / BUMS / BVSc./B.Pharm/BSc-Nursing/BOT/ BPT/ BSc-Medical Lab. Techniques/BSc with Biochemistry/ Biotechnology/ Microbiology/ Zoology/ Bioinstrumentation or any other life sciences / allied health sciences.
 - Appeared in the Entrance Test or interview conducted by Jamia Hamdard.

Department of Chemistry

The mission of the Department is to provide knowledge in Chemistry that offers opportunities for a quality and comprehensive learning experience for students. The Department offers MSc programme in Chemistry with the option of specialization in: (a) Organic Chemistry and (b) Industrial Applications. With expertise distributed over different areas in Chemistry, the faculty is engaged in teaching and research activities that prepare the students for market driven opportunities. It further helps students for employment in reputed pharmaceutical companies like Sun Pharmaceuticals Ltd., Jubilant Organosys, Glenmark, Wockhardt, Rexin, Daichi Sankyo and other allied industries in addition to placement in universities and colleges for science teaching and research institutions for doctoral & postdoctoral research positions. The Department also offers a programme in PG Diploma in Chemoinformatics under Open and Distance Learning mode. The thrust areas of research of the Department are: Natural Products Chemistry, Medicinal Chemistry, and Nanosynthesis and Drug Delivery.

Funds for research have been received from funding agencies like Department of Biotechnology (DBT), Department of Science & Technology (DST), Defence Research & Development Organisation (DRDO) and University Grant Commission (UGC).

M.Sc Chemistry

- Duration:** Two years (Four semesters)
Seats: 25 (20 General + 05 SFS)
Eligibility: A candidate must have:
- Passed BSc or equivalent examination from a recognized University with Chemistry as one of the subjects securing at least 45% marks in the aggregate.
 - Appeared in the Entrance Test Conducted by Jamia Hamdard.

Department of Medical Elementology and Toxicology

The Department of Medical Elementology and Toxicology is one of the few Departments in India having full-fledged academic programme at Postgraduate and doctoral levels in Toxicology. The Department has made its mark in toxicological research and has been supported by the Department of Science and Technology (DST) through Fund for Improvement of S&T Infrastructure in Universities & Higher Educational Institutions (FIST) programme and University Grants Commission (UGC) Special Assistant Programme (SAP). Ph.D degree in Toxicology is being awarded in different fields of toxicology. The Department has collaborative programmes with many reputed institutes such as Indian Institute of Toxicological Research (CSIR), Lucknow; Central Drug Research Institute (CSIR), Lucknow; Indian Institute of Integrative Medicine (CSIR), Jammu; Institute of Nuclear Medicine and Allied Sciences (DRDO), New Delhi etc.

Thrust Areas of Research

- Chemoprevention of cancer by plant products/indigenous medicines and standardization of such drugs.
- Targeting the molecular mechanism and elucidation of their plausible role in induction of carcinogenesis in prostate, liver, kidney and skin at preclinical stage.
- Toxic effects of endocrine disrupting chemicals (EDCs).
- Neurodegenerative disorders and their protection.
- Role of trace elements in the manifestation of diseases.
- Ecotoxicity of environmental pollutants and their interactive effects.
- Immunotoxicity of drugs and environmental chemicals and its prevention.
- Molecular mechanism of nanoparticles in toxicity manifestation.
- Animal models of arthritis for study of mechanism of action of protective agents.

The Department has received funding support from agencies such as Council of Scientific and Industrial Research (CSIR), Central Council for Research In Unani Medicine (CCRUM), Department of AYUSH, Department of Biotechnology (DBT), Department of Science and Technology (DST), Indian Council for Medical Research (ICMR), Ministry of Environment and Forests and UGC. Every year a good number of students qualify fellowships offered by government agencies. Students who have obtained degree in toxicology have got placements in various companies and R&D institutes such as Sun Pharmaceuticals Ltd., CDRI, IITR, Dabur, Torrent, Cadila, Lupin, Dr. Reddy's Laboratory, Sri Ram Institute of Industrial Research, Nestle, Himalaya etc. The Department's distinguished Alumni as faculty or post-doctoral fellows are spread all over the globe. More emphasis is given to develop academic and research skills of the students. M.Sc. programme has integral component of dissertation work in the fourth semester. After completion of the course students have job opportunities in industry and research organizations. A good number of students qualify NET examinations conducted by UGC-CSIR in life science and forensic science streams. The Department is fully-equipped with sophisticated equipment to perform research in all major fields of toxicology including *in vitro* toxicity.

MSc Toxicology

Duration: Two years (Four semesters)
Seats: 30 (25 General Category + 05 SFS Category) - inclusive of seats reserved for NRI/Sponsored category candidates. Additional seats are available for Foreign Nationals.

Eligibility: A candidate must have

- A bachelor's degree of Science (B.Sc.) with any three of the following subjects: Botany, Chemistry, Zoology, Biochemistry, Biotechnology, Microbiology, Environmental Biology or a subject of Life Sciences securing atleast 45% marks in the aggregate. Candidates who have studied Biology at 10+2 level and have B. Pharm. / B.V.Sc. / B.Sc. (Agriculture) / BMLT and other paramedical or allied sciences degree securing atleast 45% marks in the aggregate are also eligible.
- Appeared in the Entrance Test conducted by Jamia Hamdard.

PhD

The Faculty of Science offers PhD in the following disciplines:

- ✓ Biochemistry
- ✓ Biotechnology
- ✓ Botany
- ✓ Chemistry
- ✓ Toxicology
- ✓ Clinical and Translational Sciences

Duration: Minimum two years

Eligibility: Candidates desirous of admission to Ph.D. programme in Faculty of Science must have:

- Passed M.Sc. in the relevant subject securing at least 55% marks in the aggregate or equivalent grade. Department of Biotechnology and Department of Medical Elementology and Toxicology accept candidates to Ph.D. programme who possess MSc degree in Chemistry or any subject of Biological Sciences.
- Candidate having M.Sc. degree in Clinical Research with minimum 55% marks or equivalent grade shall be eligible to be considered for admission to Ph.D. programme in Toxicology and Biotechnology subject to condition that he/she has qualified NET-JRF /NET-LS or equivalent National level test conducted by government agencies such as UGC/ CSIR etc
- Qualified NET-JRF /NET-LS or equivalent National level test conducted by government agencies and recognized by UGC/Jamia Hamdard or as mentioned under the Procedure for Admission to Ph.D. Programme. Please see PhD admission guidelines for more information.
- The Candidates from Pharmacy stream may also apply for different disciplines in Ph.D. in Science subject to NET-JRF/NET-LS qualification.
- Appeared in Interview conducted by Jamia Hamdard.

PhD in Clinical and Translational Sciences is intended for individuals holding post-graduate degree M. Sc. / M. Pharm. in Clinical Research/ Pharmaceutical Sciences (Pharmaceutics and Pharmacology)/ Medical Science/ Toxicology/ Biotechnology/ Biochemistry etc.

For admission, candidates with M. Sc./ M. Pharm. background will be required to have qualified NET-JRF/NET-LS or GPAT with good ranking or equivalent test conducted by a government agency and recognized by UGC/ Jamia Hamdard or as mentioned in this Prospectus.

For admission to various programs in this Faculty,

**Please visit Online Admission Portal at www.jamiahamdard.edu
or www.jamiahamdard.ac.in**

For any further query, please contact: [Dean, Faculty of Science](#)