

**Combined Entrance Examination
conducted by
Jawaharlal Nehru University
for admission to
M.Sc. Biotechnology Programme
(General Biotechnology, Industrial,
Environmental, Marine, Medical
Biotechnology, Neuroscience, Molecular
& Human Genetics and Bioresource's
Biotechnology)**

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PROSPECTUS

ACADEMIC SESSION

2019-20

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I. GENERAL

Biotechnology is a multidisciplinary area on the educational scene and programmes have been developed to meet the growing demand for trained manpower for any meaningful Biotechnology activity in the country. The programmes are designed to expose the students to recent exciting developments in the area of genetic engineering and biotechnology and their exploitation in industry, agriculture and medicine.

Jawaharlal Nehru University will hold a Combined Entrance Examination for admission to 2-Year M.Sc. Programme in Biotechnology on behalf of following participating Universities:

1. University of Allahabad, Allahabad (M.Sc. Biotechnology)
2. Annamalai University, Tamil Nadu (M.Sc. in Marine Biotechnology)
3. Baba Ghulam Shah Badshah University, Rajouri (M.Sc. in Bioresource's Biotechnology)
4. Banaras Hindu University, Varanasi (M.Sc. Biotechnology)
5. Banaras Hindu University, Varanasi (M.Sc. in Molecular & Human Genetics)
6. University of Calicut, Kerala (M.Sc. Biotechnology)
7. Devi Ahilya Vishwavidyalaya, Indore (M.Sc. Biotechnology)
8. Goa University, Goa (M.Sc. in Marine Biotechnology)
9. Gulbarga University, Gulbarga (M.Sc. Biotechnology)
10. Guru Jambheshwar University of Science & Technology, Hisar (M.Sc. Biotechnology)
11. Guru Nanak Dev University, Amritsar (M.Sc. Biotechnology)
12. Himachal Pradesh University, Shimla (M.Sc. Biotechnology)
13. HNB Garhwal University, Garhwal (M.Sc. Biotechnology)
14. University of Hyderabad, Hyderabad (M.Sc. Biotechnology)
15. University of Jammu, Jammu (M.Sc. Biotechnology)
16. Jawaharlal Nehru University, New Delhi (M.Sc. Biotechnology)
17. Kumaun University, Nainital (M.Sc. Biotechnology)
18. University of Lucknow, Lucknow (M.Sc. Biotechnology)
19. Maharshi Dayanand University, Rohtak (M.Sc. in Medical Biotechnology)
20. M.S. University of Baroda, Vadodara (M.Sc. Biotechnology)
21. University of Mysore, Mysore (M.Sc. Biotechnology)
22. University of North Bengal, Siliguri (M.Sc. Biotechnology)
23. North Eastern Hill University, Shillong (M.Sc. Biotechnology)
24. Pondicherry University, Pondicherry (M.Sc. Biotechnology)
25. Savitribai Phule Pune University, Pune (M.Sc. Biotechnology)
26. Sardar Patel University, Anand (M.Sc. in Industrial Biotechnology)
27. Shivaji University, Kolhapur (M.Sc. in Environmental Biotechnology)
28. Tezpur University, Tezpur (M.Sc. in Molecular Biology & Biotechnology)
29. Utkal University, Bhubaneswar (M.Sc. Biotechnology)
30. Visva-Bharati University, Santiniketan (M.Sc. Biotechnology)
31. Jiwaji University, Gwalior (M.Sc. in Neuroscience)
32. Sri Padmavathi Mahila Vishwavidyalayam, Tirupati (M.Sc. Biotechnology)

The Entrance Examination will be held on May 30, 2019 at Centers all over the country (detail of these examination centers is shown under Section XII of this Prospectus).

* Subject to revision of seats in programs

Major thrust areas in teaching and research of participating Universities are given below:

1. UNIVERSITY OF ALLAHABAD, ALLAHABAD (24 seats) *

M.Sc. course in Biotechnology at Allahabad University runs on a semester system comprising of four semesters. Students admitted to the course are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. In addition to M.Sc. teaching programme, University also offers DPhil programme in various areas of Biotechnology. The core faculty members of Centre and from other departments share their expertise to teach the course. The Centre offers courses in Analytical Techniques, Biochemistry, Genetics and Microbiology, Biostatistics and Computer applications in Biotechnology, Biophysical Chemistry, Cell Biology, Molecular Biology, Fermentation Technology, Animal Biotechnology, Genetic Engineering, Immunology, Plant Biotechnology. The method of teaching includes multimedia presentation and combination of lectures/practicals by faculty and guest speaker, seminar and journal club presentation. Time to time Centre also organizes lecture by eminent academician/ scientist/industrialist. Students are required to undertake research project in IVth Semester in one of the research areas offered by faculties of the Centre.

The Centre is currently pursuing research programme in the following areas:

Plant Biotechnology - Molecular Biology - Biosensor development and bioenergy resources - Biofuel - Microbial and Mushroom Biotechnology - Nanobiotechnology and Gene delivery - Stem cell Biology - Molecular biology of Cynobacteria .

The students have the option to work for summer project of 6-8 weeks in National Laboratories and other premier institution at the end of first year. The curriculum is regularly modified and updated time to time. At present the course design is being pursued in light of proposed DBT curriculum and latest development made in the field.

Fees to be paid at the time of Admission: Rs.3810/- (including refundable caution fee Rs.2000/-) excluding Hostel expenses.

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2. ANNAMALAI UNIVERSITY, TAMIL NADU (10 seats) *

Students admitted to the programme are eligible for the award of M.Sc. degree in Marine Biotechnology on successful completion of the course run by the Centre of Advanced Study (CAS) in Marine Biology of this University

The CAS in Marine Biology is a reputed marine research institute in India, actively engaged for the last 57 years in teaching, research and extension with an ideal location and easy access to different Coastal biotopes such as, estuary, mangroves, backwaters and nearshore waters. It has made rapid strides in various facets of marine Sciences. This Centre, the brain child of the Eminent Scientist (Late) Professor RV Seshaiya was started as a field laboratory for the Department of Zoology, Annamalai University in 1957, and was recognized for its outstanding research contribution by the University Grants Commission as the Center of Advanced Study in Marine Biology in 1963 and the UGC continued to extend its generous assistance till date through SAP and Potential of Excellence in Particular Area (CPEPA) in Marine Biology. Recently, Annamalai University has been awarded with “A” Grade by the National Assessment and Accreditation Council of UGC. The University has become State University under Annamalai University act 2013. Environmental Information System (ENVIS) and All India Co-ordinated project on “Coastal Biodiversity (East Coast of India)” are the important activities of our Centre supported by the Ministry of Environment, Forest and Climate Change (MoEFCC). This programme got Best ENVIS Centre award among all the Centres of India in 2006. Our Centre has been identified as Centre of Excellence in Marine Biology by Ministry of Earth Sciences (MoES), New Delhi and the Centre is involved as a participating institution in the national and network programme on Coastal Ocean Monitoring and Prediction System (COMAPS), Harmful Algal Bloom (HAB), Marine Living Resource Assessment for cephalopods and gelatinous zooplankton, Benthos, etc. The DST – FIST programme recognised the Centre during the period 2000 – 2007. Recently the DST has extended its support through PURSE Programme. In 2013, the Ministry of Human Resource Development (Govt. of India) has identified this Centre to set up a Centre of Excellence for training and research in frontier areas of science and technology. The Centre has become a separate Faculty as “Faculty of Marine Sciences” from the academic year 2010 – 2011. Recently, the Centre made a record of producing 700 + PhDs. This Centre has all the essential infrastructure facilities, such as, library, marine reference museum, marine aquarium, experimental aquaculture ponds, instrumentation centre, seawater circulation system and seaworthy Boats as well as sophisticated instruments such as MALDI – TOF – TOF, CHNS&O analyser, Microbial Identification System, GC-MS, ICP, FTIR etc. The Centre has also provided with high speed internet facility.

Academic programmes :

As drafted by Department of Biotechnology, Government of India, curriculum for M.Sc. Marine Biotechnology Programme is been implemented. The Syllabus includes Biochemistry, Molecular Biology, Fishery Resources, Conservation and Oceanography, Marine Microbiology, Biostatistics, Biophysical principles and Analytical techniques, Cell and Developmental Biology, Genetic Engineering, Aquaculture Bioprocessing and Pharmacology, Fish Immunology and Health Management, Aquatic Environmental Biotechnology, Marine Bioprocess Technology, Aquaculture Biotechnology, Bioinformatics, Intellectual Property Rights, Biosafety and Bioethics, Bioentrepreneurship. Independent research topics are undertaken by students as a part of their curriculum on the following thrust areas: Shrimp Immunology, Characterization of novel plasmid from marine microbes, marine pharmacology, regulatory mechanism of endocrine system, functional physiology of halophilic microbes and molecular taxonomy of marine organisms. Our Centre has 33 faculties specialized in Marine Biology & Oceanography, Biotechnology, Microbiology, Oceanography, Pollution Toxicology, Aquaculture, Chemistry, Physics, Mathematics, Engineering, Bioinformatics, & Computer Science. Besides, this course is supported by associated faculties from Faculty of Science- Dept. of Biochemistry, Earth Science, Statistics, Physics; Faculty of Engineering & Technology-Dept. of Pharmacy, Chemical Engineering and Faculty of Medicine- Dept. of Microbiology. Special lectures by eminent scientists.

In addition, our Centre is also offering six post graduate courses on Marine Biology and Oceanography, Coastal Aquaculture, Marine Microbiology, Marine Food Technology, Marine Pharmacology and five year integrated programme on Ocean Science and Technology as well as Bachelor of Fisheries Sciences (B.F.Sc.) and B.Voc. Aquaculture.

Fees to be paid at time of Admission: Rs.30,095/- per annum

Boarding & Lodging at Hostel Rs. 50,000/- per annum (approx.)

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3. BABA GHULAM SHAH BADSHAH UNIVERSITY, RAJOURI (J&K) (10 Seats)*

Baba Ghulam Shah Badshah University came into existence by the Baba Ghulam Shah University Act No. XVI of 2002 of the Jammu and Kashmir legislative Assembly and became functional in the year 2005.

In 2008, the School of Biosciences and Biotechnology started running a 4 semester, full time Master's Programme on Bioresources Biotechnology to generate manpower skilled in various aspects of Biotechnology and Bioresources. The wed-lock between Bioresources and Biotechnology is aimed at equipping students for raising value added products from the Bioresources. The syllabus, besides covering all important aspects of Biotechnology such as Cell and Molecular Biology, Biomolecules and Microbial Physiology and Genetics, Enzymology and Biochemical Techniques, Genetic Engineering, Genomics and Functional Genomics, Bioenergetics and Metabolism, Bioinformatics and Biostatistics, Biology of immune System, Bioprocess Engineering and Technology and Animal and Plant Biotechnology, also has papers on Plant and Animal Bioresources, Characterization, Evaluation and Exchange of Bioresources and Bioresources; Assessment, Threats and Conservation. Faculty in the School is such that all these areas are competently taken care of. Besides the residential faculty, the students are able to interact with eminent workers in the field who visit BGSBU. The students also make trips to important Centers of learning. National Laboratories and Industry. The School has a number of research and extension projects sponsored by DBT, DST, MOEF, GBPIHED, Spice Board and NMPB.

The M.Sc. programme was started in BGSBU from the session 2011 with the Financial support of DBT, Government of India.

Fees to be paid at the time of Admission: Rs. 47,000/-

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4. BANARAS HINDU UNIVERSITY, VARANASI (21 seats) *

M.Sc. (Biotechnology) programme at Banaras Hindu University runs on a semester system consisting of four semesters (80 credits). Students admitted to the programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course.

Besides the core faculty members of the School the Faculty members from the Institute of Technology also share their expertise in teaching this multidisciplinary course. The School offers courses in Microbiology, Cell Biology, Biochemistry & Biophysics, Genetics and Molecular Biology, Biology of the Immune System, Enzymology and Enzyme Technology, Genetic Engineering, Plant Biotechnology, Animal Cell Culture, Environmental Biotechnology, Bioprocess Engineering and Technology, Bioinformatics & Biostatistics, and **one year dissertation project work in one of the research areas** of the School and present seminars related to their project topics in the third and fourth semesters. The evaluation of M. Sc. examination is based on credit system. In addition to the above M.Sc. Biotechnology students will be selecting Massive Open Online Course (MOOCs)-SWAYAM course in the II and III semester of 4 credits. A dissertation project forms an integral part of the M.Sc. curriculum. **In year 2018 School of Biotechnology, Institute of Science, BHU has received Shanghi Global ranking 385 which is a rare achievement at the University and National level.**

The School is currently pursuing research programmes in the following areas:

- Plant Tissue Culture and Plant Biotechnology
- Cellular and Molecular Immunology and Tumor Immunology
- Molecular Microbiology with emphasis on Plant growth promotion
- Functional genomics in bacteria
- Environmental Biotechnology
- Enzymology and Enzyme Technology

The School has received financial support under UGC-SAP (DRS-Phase-III), DST-PURSE and DST-FIST Programme and is part of the DBT supported interdisciplinary School of Life Sciences. The School also has a Sub-DIC Centre for Bioinformatics supported by the DBT, which has all the facilities related to teaching and research *in silico* for the M. Sc. and Ph. D. Biotechnology students.

Fees to be paid at the time of Admission: Rs. 7000/- (Approx.)

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5. BANARAS HINDU UNIVERSITY, VARANASI (20 Seats) *

M.Sc. in Molecular and Human Genetics at Banaras Hindu University is a DBT-sponsored teaching programme (2 year) runs on a semester system (4 semester). Students admitted to the programme are eligible for the award of M.Sc. degree in Molecular and Human Genetics on successful completion of the course run by the Department of Molecular and Human Genetics, Institute of Science, Banaras Hindu University. This programme offers courses in Transmission Genetics, Basic Human Genetics, Molecular Genetics, Biochemistry, Cytogenetics, Cell Biology, DNA Technology and Genetic Engineering, Bioinformatics and Biotechniques, Model Genetic Systems, Genomic instability and Cancer, Human Genome, Reproductive Genetics, Human Molecular Genetics, Clinical Genetics, , Developmental Genetics, Immunogenetics, Population and Evolutionary Genetics, Neurogenetics, and Genetic Counseling and Intellectual Property Rights. In addition, students are allowed to choose any two of the SWAYAM courses of their interest offered by UGC. The core faculty members of the department and from other departments of Institute of Science and Institute of Medical Sciences share their expertise to teach the course. The teaching program includes 'Summer Training' in well-established molecular biology research laboratories in different parts of the country, a Dissertation Project, Formulation of Research Project as "Dream Project", and Seminar presentation by each student. This unique course curriculum also includes clinical assignments to each student and visits to the hospital at Institute of Medical Sciences (Banaras Hindu University), case-presentation, and hands-on training in molecular diagnosis and genetic counseling.

The Department of Molecular and Human Genetics is well recognized all over the country for its standard of teaching and research. The M.Sc. students of the department have high success rate in national level tests like NET-JRF (CSIR/UGC), BET-JRF (DBT), NET-JRF (ICMR), and GATE. The students have been placed in prestigious research institutes in India and across the globe for pursuing Ph. D. and Postdoctoral studies. The faculty members have attracted extramural research funding from different funding agencies such as DBT, DST, UGC, CSIR, DAE etc. The major research areas of the department include Signal transduction, Cancer Biology, Neurogenetics, Reproductive Genetics and Immunogenetics.

Fees to be paid at the time of Admission: Rs. 8000/- (Approx.)

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6. UNIVERSITY OF CALICUT (12 seats) *

Students admitted to the programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. The department is following the DBT model curriculum for the 2 year (4 semester) M.Sc. Biotechnology teaching programme. The first and second semester offer theoretical and practical training in Cell & Developmental biology, Biochemistry, Microbiology, Analytical techniques, Molecular biology, IPR & Biosafety, Biostatistics & Bioinformatics, Immunology and Genetics. In the third semester, advanced courses, namely, Bioprocess engineering, Genetic engineering, Genomics & Proteomics, Plant biotechnology and Immunotechnology are offered. The fourth semester includes a research project in addition to a course on Bioentrepreneurship and Seminar presentations on recent advances in biotechnology. The department has a weekly journal club in which the students present research articles of topical interest from reputed journals.

In addition to the M.Sc. programme, the department also runs M.Phil. and Ph.D. programmes. The thrust areas of research include Cell & Molecular biology, Enzymology and Medical Biotechnology, Immunotechnology, Recombinant DNA technology, Bioprocess technology and Cancer biology. The students of this department have consistently given excellent performances in the competitive examinations held for the award of GATE, DBT, UGC / CSIR- NET/JRF and are placed in premium institutions of national and international repute.

Fees to be paid at the time of Admission: Rs.9215/- (1st year i.e. I Semester and II Semester) and Rs. 7560/- (2nd Year i.e. III and IV Semester) Initial deposit received from JNU will be adjusted as developmental fee. Change in fee structure subjected to general revision if any adapted by the University will be applicable.

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7. DEVI AHILYA VISHWAVIDYALAYA, INDORE (16 seats) *

Devi Ahilya Vishwavidyalaya (DAVV) is an 'A' grade NAAC accredited University and offers highly conducive environment for higher education and Research. Students admitted to the programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. DAVV has opted for Choice Based Credit System (CBCS) and follows semester system comprising of 04 Semesters. The School of Biotechnology offers teaching in Biochemistry, Cell and Developmental Biology, Molecular Biology, Analytical Techniques, Computer Applications, Bioinformatics and Biostatistics, Immunology, Genetic Engineering, Genetics, Enzyme & Enzyme Technology, Bioprocess Engineering and Technology, Microbiology and Industrial Applications, Metabolic Engineering, as the core subjects and 08 Elective subjects (Genomics and Proteomics, Environmental Biotechnology, Protein Engineering, Cancer Genetics, IPR & Biosafety, Animal Tissue Culture, Pharmacogenomics, and Stem Cell Biology) out of which students can select any 06 Elective subjects. There are also some soft skill based subjects (Seminar & Research Proposal Writing skills) which helps in overall student development. To hone the research skills of students, the fourth semester is completely dedicated to research dissertation work.

The project work is evaluated on the basis of power point presentation and dissertation report. The assessment of the dissertation report is done by one external and one internal examiner. To give technical exposure to the students, the School also encourages the students to undergo summer training in other institutes/industries for a period of six weeks after completion of second semester. The research areas of the school are crop improvement by early diagnosis of stress conditions, Biophysical and biochemical characterization of abiotic stress responses in plants, Bioremediation and degradation of environmental pollutants by microbes, role of inflammatory signaling in metabolic disorders, development of potential drug candidates and therapeutic targets with reference to metabolic disorders including diabetes mellitus, obesity, cardiovascular problems, metabolic syndrome and thyroid abnormalities etc.

Fees to be paid at the time of Admission: Approx Rs.13300/- (for one semester). Besides, Rs.4000/- caution money (refundable after completion of the course). Please note that this fee is for day scholars. If hostel required, please contact Chief Warden of the University for hostel charges etc.

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8. GOA UNIVERSITY, GOA (26 seats) *

Goa University is a NAAC “A” grade accredited institution. Students admitted to the programme are eligible for the award of M.Sc. degree in Marine Biotechnology upon successful completion of the course. The Department is being funded by the DBT from the time of its inception in 1988 and since 2008 has had the added distinction of being DST-FIST sponsored. The Courses offered for the M.Sc. programme are covered over four semesters and while ensuring that all key aspects of general Biotechnology are covered, the outgoing students are, in addition, fully equipped for a career in Marine Biotechnology. Goa University follows a Choice Based Credit System (CBCS). During the first year, emphasis is given on understanding physicochemical aspects of biology and the marine ecosystem and include Microbiology, Ecology, Biochemistry, Molecular Biology, Biophysical Principles & Analytical Techniques, Immunology, Oceanography & Marine Bioresources, Cell Biology, Biostatistics, Bioinformatics, Cell & Tissue Culture, Developmental Biology and Stem Cell Biology. More advanced and application-oriented courses such as Aquaculture Technology, Bioprocess Technology, Potential of Marine Biotechnology, IPR, Biosafety & Bioethics, Bioentrepreneurship, Cellular Biophysics, Genetic Engineering, Marine Food Technology, Enzyme chemistry & applications, Molecular Immunology, Nanobiotechnology, Genomics and Proteomics as well as Scuba Diving are offered during the second year.

Separate laboratory courses in each subject enable every student to gain hands-on experience with all the available instruments. The well-equipped laboratories enable the students to take up dissertation work within the Department itself during the third and fourth Semesters. The major Thrust Areas in the Department are: study of biotechnologically important proteases, lipases and polysaccharases from coastal / deep sea bacterial, fungal and thraustochytrid isolates. Biodiversity of actinomycetes and sulphate reducing bacteria from marine salterns of Goa. Potential anti-bacterial and anti-fungal compounds against clinical pathogens from hypersaline halotolerant bacteria and actinomycetes. Extraction of toxins from marine organisms. Study of marine algae as a source of biofuels, lectins and nutraceuticals. Alkaloids of medicinal value from plants. Assessment of bacterial pathogens from mangrove ecosystems. Identification of novel molecules from *G. nervosa* as starch blocker. Bioactive cationic peptides. Application of salt pan bacteria in aquaculture and as a biofertilizer in paddy fields. Evaluating the production of potential tyrosinase inhibitors from hypersaline bacteria. Microbial bio-surfactants. Applications of nanoparticles from anaerobes. Novel viruses from coastal ecosystems and hot springs. Summer training (4-6 weeks) is mandatory at the end of the second semester for which the students are placed in R & D laboratories of nationally recognized Institutes and Industries. Most of our postgraduate students qualify for the CSIR/UGC fellowship and some of them also secure a very high ranking at the GATE examination. This is in addition to their achievement at the DBT and ICMR fellowship examinations. The placement profile of each outgoing batch has also been commendable, with the students successfully gaining positions in nationally as well as internationally renowned institutions. The University has close interaction with the National Institute of Oceanography, Goa for both teaching as well as research. Besides, the Department also has active research collaboration with the following National Institutes: ICAR Research Complex (Goa). National Centre for Antarctic and Ocean Research (Goa) and BITS Pilani (K.K. Birla Goa Campus) and Department of Fisheries Goa.

Fees to be paid at time of admission:

- Rs 19,800/- Annual tuition fees (inclusive of the refundable Rs.2,030/-).
- Hostel charges: accommodation fees of Rs.6000/- per year
- Annual Mess charges for Hostels: Rs. 36,825/-(vegetarian); Rs.40,068/- (non-vegetarian)
- Hostel Caution Deposit (refundable) : Rs. 3,000/-

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9. GULBARGA UNIVERSITY, GULBARGA (10 seats) *

Students admitted to the Programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. They can also avail facility of additional diploma in Nanoscience offered in the University, and course in professional computational excellence. The Department offers M.Sc. semester based CBCS courses in cell and developmental Biology. Biochemistry, Microbiology, Analytical Techniques, Immunology, Bioinformatics, Genomics and Proteomics Molecular Biology and Genetics, General Biotechnology, Animal Biotechnology, Genetic Engineering, Food Biotechnology and Bioprocess Engineering. Molecular Biology and Environmental Biotechnology, IPR and Biosafety, Plant Biotechnology, Proteomics, Genetics, Medical and Nano Biotechnology, Immune Technology, Microbial Technology. The new revised syllabus proposed by DBT is implemented from the year 2010 – 11 with updated inputs, and also choice from other science departments. Students are also assigned with the project work, review article preparation and seminars. A study tour to undertake hands on training in sophisticated industry/institute is encouraged. The project work on one of the advanced/emerging area is compulsory.

The department runs KBITS sponsored finishing school in Biotechnology with assistance from Govt of Karnataka and DBT. The students are selected through all India entrance test and are eligible to receive Rs 10000/- as stipend and industrial training for 6 months. The centre has all essential facilities, such as, Instrumentation laboratory, Cell and tissue culture laboratory, virtual learning resource center and digital library and video conferencing, and a pilot plant facility for Biodiesel products. The Department has received various research projects funded by CSIR, DBT, DST, AICTE, MOWR, UGC, KSBDB. The department is collaborated for research activities with national institute/Organization such as SBI, Coimbatore, VSI, Pune; NIMHANS, Bangalore; Biocon, Bangalore; Novozymes, Bangalore, the University is a partner in Erasmus Mundus action plan. – 2 under SVAGATHA and FUSION Project. Students have opportunity to study amongst 16 European Universities under this programme.

The M.Sc. students of the department have qualified national exams such as DBT, JRF, CSIR-JRF, NET, GATE, NII, SLET, etc.

The major research areas of the department are

Plant tissue culture, Plant molecular biology and biofuels A
 biotic and biotic stress response in plants
 Animal Biotechnology and pharmaceutical Biotechnology
 Medical Biotechnology and Phage therapy
 Industrial Biotechnology and Fermentation Technology Pharmacokinetic
 studies of plant based bioactive molecules and Bioinformatics & protein –
 interaction

Fees to be paid at the time of Admission: Rs. 20,000/- (Approx.)

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10. GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR (14 seats) *

Guru Jambheshwar University of Science & Technology (GJUS&T) is three times NAAC 'A' grade accredited University. Students admitted to the programme in the Department of Bio & Nano Technology of GJUS&T, Hisar are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. Department has state of art facilities and well-established modern laboratories equipped with latest sophisticated instruments. Besides the Major Research Projects from UGC, DBT, DST, DRDO, HSCST, MOEF, faculty of the department also has various international research projects in collaboration with Cairo University, Cairo, Egypt; Institute of Microbiology and Virology, Ukrainian National Academy of Science, Kyiv, Ukraine; Asian Institute of Technology, Bangkok, Thailand; Hanyang University, Seoul, Republic of Korea; University of Maryland, USA; Technical University of Cartagena, Cartagena, Spain. The Department is also supported by UGC-SAP-DRS-II program, World Bank TEQIP-III, RUSA, DST-PURSE and DST-FIST program.

This is DBT-sponsored programme offering courses in Introductory Biotechnology, Biomolecules and Metabolism, Cell Biology, General & Applied Microbiology, Theory & Applications of Biotechniques, Molecular Biology, Fundamentals of Immunology, Plant Cell, Tissue and Organ Culture, Fermentation Technology, Genetic Engineering, Enzymology & Enzyme Technology, Molecular Genetics, Principles of Nanobiotechnology, Introductory Bioinformatics, Agricultural Biotechnology & IPR, Environmental Biotechnology, Medical Biotechnology, Genomics and proteomics. Course content also have open elective courses along with MOOC through SWAYAM. The students have to undergo a three to four weeks of in plant/summer training in various institutes/industries during summer program. Fourteen to sixteen weeks of investigation problem during the 4th semester forms an internal part of the program. The courses offered are innovative in several respects with major thrust being different research areas pertinent to Plant Biotechnology & Food Biotechnology, Microbial Biotechnology, Environmental Microbiology and Nano Science & Technology. Credit based system of examination on international pattern basis has been introduced from the Academic Session 2006-07.

Fees to be paid at the time of Admission: Rs. 16328/-(Approx.)

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11. GURU NANAK DEV UNIVERSITY, AMRITSAR (10 seats) *

Students admitted to the programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course.

Students are imparted theoretical and practical training in Biochemistry, Microbiology, Genetics, Computer Applications and Biostatistics, Biochemical and Biophysical Techniques in the first semester. During the second, third & fourth semesters, students are trained in specialized areas of Genetic Engineering, Immuno Biotechnology, Plant and Animal Tissue Culture, Biochemical Engineering, Fermentation Technology, Microbial Biotechnology, Enzymology, Genomics and Functional Genomics and Bioinformatics. In the fourth semester, students are also required to work on a small independent research project to sharpen their scientific skills and knowledge under the guidance of a faculty member and also graded seminars are conducted. The project work is evaluated by an assessment committee constituted for this purpose. Following a satisfactory report, the student is recommended for the award of M.Sc. degree in Biotechnology.

The Department is well equipped with modern instrumentation and infrastructure to allow and encourage the students to explore the field/problem of their choice in disciplines of Biotechnology.

Fees to be paid at the time of Admission: Rs. 45490/- + 19550/- (Hostel Charges)(Approx.) (Subject to change as per University guidelines)

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12. HIMACHAL PRADESH UNIVERSITY, SHIMLA (15 Seats) *

Students admitted to the programme are eligible for the award of M.Sc. Degree in Biotechnology on successful completion of the course. The students shall be introduced to the theoretical and practical aspects of the major areas of Biotechnology. The courses offered in the first semester are: Remedial Course 1 Introductory Mathematics (for biology students) or 2 Introductory Biology (for Non-Biology students), Biochemistry, Microbiology, Molecular Biology and Instrumental Methods of Analysis. The students will study Recombinant DNA Technology, Immunology and Immuno Technology, Plant Biotechnology and Animal Technology and Biochemical Engineering in the second semester. They shall undertake Environmental Microbiology and Biotechnology, Fermentation Technology, Computer and Bioinformatics, Enzyme Technology and a special paper in third semester. For specialization the students will opt any one of the elective paper: Biocatalysts and Biotransformation, Food Technology, Metabolic Engineering and Nano Biotechnology. They are required to undertake a major research project in the area of biotechnology in fourth semester.

Fees to be paid at the time of Admission: Rs.11670/-(Approx.). Admission fee @Rs.1000/- Alumni fee

Contact Address:

Prof. Duni Chand
Chairman & Coordinator
Department of Biotechnology
Multifaculty Bolding Phase-I, Gyan Path
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13. HNB GARHWAL UNIVERSITY, GARHWAL (13 seats)*

H.N.B. Garhwal University (A Central University) situated in the heart of Himalaya, offers highly conducive environment for higher education and research. It attracts students from 15 Universities of 10 States (average last 5 yr.). The students have been rated highly motivated, alert, articulate and aware (Resonance, July 2003, IISc Bangalore). The Department identified for excellence in research & teaching by UGC through SAP & COSIST, DST- FIST and DBT-HRD, has emerged as a hub of scientific activity and quality Human Resource Development in Biosciences. Most striking features are its warm ambience, strong student-teacher rapport, student participatory approach and inquiry based interactive learning system (aided with computers) conducive to critical thinking and personality building. The department has well equipped laboratories, Hi-Tech classrooms with modern teaching audiovisual aids Central Instrumentation Facility, Library (eight thousand books) and computer labs with broadband internet facility.

The Department offers two-year M.Sc. Biotechnology degree course. In the early semesters, fundamentals of Biochemistry, Molecular Biology, Genetics, Microbiology, Immunology, Genetic Engineering, Enzymology, Legal Biotechnology, Computer programming and Market Management are included in the syllabi. In the late semesters course includes Cell and Tissue Culture, Biochemical & Molecular Endocrinology, Bioinformatics, Environmental Biotechnology and Bioprocess Engineering, elective courses on advance area of biotechnology like Food and Beverage Technology, Pharmaceutical Biotechnology and Drug designing, Immunotechnology, Fermentation Technology, Fish Biotechnology and Biomedical Technology etc are taught. The students also required to undertake dissertation / thesis work.

H.N.B. Garhwal University, following several student interactive brainstorm with renowned Scientists of the country has provided a 3-tiered roadmap strengthening knowledge of basics, up-linking with the industry & rendering it society relevant-through integrative, flexible curricula. The high profile basic and vocational PG courses, adjudged of very high standard and utility' by UGC-NAC, 2003, groom students for academic excellence. The Department has an excellent track record of its students qualifying for national (NET-CSIR / UGC, GATE, ICMR, NII, CCMB, DRDO, IIT, JNCAR, BARC etc.) and international fellowships (USA, UK, Korea, Finland, Germany etc.). Students of this Department have been successful in securing placement in top biotechnology industries viz., Sanofi Aventis, Biocon, Panacea Biotech, Pfizer, Ranbaxy, Sun Pharma, Genetix etc. Major thrust area of research are Animal Behaviour, Endocrinology, Molecular Physiology, Immunodiagnosics, Genetic diversity, phylo-geography, Conservation Biology, Bioinformatics and Microbial biotechnology. Faculty serve on prestigious national & international bodies. Website: www.hnbgau.ac.in

Fees to be paid at the time of Admission: Rs.3800/- (Tuition, examination etc. excluding lodging, boarding which is available at nominal price)

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Head & Coordinator
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14. UNIVERSITY OF HYDERABAD, HYDERABAD (20 seats) *

The University of Hyderabad is a premium institute of higher education and research in India which has been frequently ranked at top slots by different ranking services based on the research output and academic excellence. The University is recognized as 'University with Potential for Excellence' by the University Grants Commission (UGC). The University has also been rated by the NISSAT (National Information System for Science and Technology) of the Department of Scientific and Industrial Research (DSIR), Government of India, as the only University under the 'High Output-High Impact' category among the top 50 institutions in India with publications in citation-indexed journals. Rated always at top grade by the NAAC, the University has had a distinct and rare honor of being qualified for the very exclusive PURSE award given by the Prime Minister of India. Several of the schools, departments and centres in the University have been identified for Special Assistance Program (SAP) of the UGC and the FIST (Fund for Improvement of Science and Technology) program of the Department of Science and Technology (DST) of the Indian Government. In addition to this, the DST has established High Performance Computing facility, Centre for Nanotechnology, Centre for Modeling Simulation and Design at University of Hyderabad under the FIST Program. The University has several state of art core facilities such as confocal microscopy facility, scanning transmission electron microscopy facility, Biological Safety Level 3 facility, animal house and green houses to name a few.

The Department of Biotechnology and Bioinformatics at the University of Hyderabad offers application oriented and sought-after courses in the areas of Biotechnology and Bioinformatics. Innovation based training is imparted to the students with a special emphasis on basic concepts of biological processes in order to pursue research in frontier areas of modern biology. A total of 12 independent research groups are active at the department studying molecular and cellular processes involved in health and disease with an emphasis on discovery/invention of diagnostic and interventional approaches and molecules and identification of targets with respect to bacterial, parasitic and viral infections, cancer and neurodegenerative diseases. Bacterial genomics/functional genomics, cellular biology, microbial biology, protein biochemistry and structure function studies, bioinformatics and computational biology constitute major skill domains of our research groups. In addition, the Department has an exclusive expertise in generation and analysis of high throughput genome sequence data of bacterial species and harnessing them towards discovery of new gene functions and pathways. Currently about 80 scholars are enrolled for PhD program in Biotechnology and about 12 post-doctoral scientists are working at the Department. Teaching and research programs of the department are supported by special grants from the Department of Biotechnology and the UGC towards MSc and M. Tech. The faculty members at the Department are supported with several extramural grants and recognized at various national and international sciences societies. The Department actively participates in several international research student exchange and training programs with international agencies such as German Research Foundation (IRTG1673), European Commission (FP7: Marie-Curie IRSES), DAAD and Academia Sinica etc. The Department has numerous facilities such as animal cell culture facility, bacterial culture and viral, HIV culture facility, neuronal and neuroglial culture facility and stem cell culture facility. Further, it has several essential instruments such as centrifuges, spectrophotometers, PCR machines, HPLC, shakers, incubators, real time PCR and flow cytometers, Fluorescence Microscope, Spectrofluorometer, Jasco Circular Dichroism Spectrometer, Molecular Imager Tharos FX plus System etc. The students can benefit from the state of art confocal microscopy facility genomics, proteomics and metabolomics facility available in the School of Life Sciences. The Bioinformatics infrastructure facility, funded by the Department of Biotechnology, Government of India is a well established facility and produced excellent research publications during the past couple of years. The Department actively liaises with the industry in Biotechnology and IT sectors to find placement and internship/professional training opportunities for our students.

Fees to be paid at the time of Admission: Rs.10430/- (including a refundable deposit of Rs.1755); hostel fee/mess deposit, as admissible, are to be paid separately at the time of admission.

Contact Address:	Prof. J S S Prakash Head & Coordinator Department of Biotechnology & Bioinformatics School of Life Sciences University of Hyderabad Prof. C. R. Road, Gachibowli Hyderabad – 500 046 (Telangana) Phone No: 040- 23134730, 23134731 Mobile No : +91 8639667564 Fax No : 040-23010145, 23010120 E-mail : head.dobb@uohyd.ac.in , syamsunderp@yahoo.com office.dobb@uohyd.ac.in Website : www.uohyd.ernet.in
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15. UNIVERSITY OF JAMMU, JAMMU (10 seats) *

The Department of Biotechnology was established in the year 1999 and is funded by the Department of Biotechnology (DBT), Govt. of India, New Delhi. During 2008, the nomenclature of the department was changed to School of Biotechnology.

The School is DST-FIST and UGC- SAP supported. The faculty has attracted extramural funding from National and International funding agencies. About 380 students have graduated from the school and 80% have cleared National tests like NET-JRF (CSIR/UGC) BET-JRF (DBT) and NET -JRF (ICMR) and GATE. The students have been placed in prestigious research institutes in India and across the globe for pursuing Ph. D. and Post-doctoral studies. The school has established Memorandum of Understanding with prestigious institutes and universities from India and abroad for fostering collaborative research and exchange of students and scientists. The Bioinformatics centre supported by the DBT, Govt. of India is fully functional in the School. The School also conducts short term courses

workshops in Bioinformatics for University and college teachers and research scholars.

The School is housed in a state of art building. Four M. Sc. laboratories and the central facility laboratory of the School are fully equipped to conduct experiments prescribed in the syllabi. The School also houses six research laboratories wherein all the necessary facilities including sophisticated instruments have been placed. The School has added high throughput sequencers (NGS), to its impressive list of super specialized equipments. At the moment the progress is being made on establishment of Animal Cell Culture facility and Animal house. The School follows DBT and UGC National syllabi. During the 4th semester of M. Sc. Biotechnology programme the students have to conduct original Research work and submit a dissertation to the University which is evaluated by the Board of External and Internal Examiners.

The thrust areas of research in the School in which M. Sc. Students also conduct their research in 4th semester are:

- ☐ Plant Genomics
- ☐ Molecular Biology
- ☐ Metabolomics
- ☐ Bioprospecting
- ☐ Metagenomics
- ☐ Biomolecules from fungi and plants
- ☐ Fermentation and Industrial Biotechnology

Fees to be paid at the time of Admission: Rs.15950/- (approx.)

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16. JAWAHARLAL NEHRU UNIVERSITY, NEW DELHI. (39 seats) *

The School of Biotechnology was one of the first six centres established under the aegis of Department of Biotechnology (DBT), Govt. of India for carrying out Postgraduate teaching and research in areas related to Biotechnology. Initially established as a Special Centre for Biotechnology in 1985, it was upgraded to the level of a School in the year 2006.

Over the years the Biotechnology programme at JNU has established itself as a leading academic programme both from the teaching and research point of view. The faculty of the School is internationally recognized for basic and applied aspects of biotechnology research.

The School for Biotechnology emphasizes teaching of Physico-Chemical and quantitative aspects of Biology in the early semesters including Bio-organic Chemistry, Biochemistry, Microbiology, Biophysical Chemistry, Cell Biology, Biomolecules, Immunology, Molecular Biology & Molecular Genetics, Mathematics, Elementary Engineering and Bioprocess Technology. In the later semesters, specialized courses on Downstream processing, Virology, Computational Biology, Molecular Biology of Eukaryotic Systems, Genetic Engineering and its Applications, Animal Cell Technology and Bio-informatics are offered. Students also deliver seminars as part of the course curriculum.

M.Sc. students also participate in major research projects starting in the third semester in one of the following areas:

- Molecular Biology and Genetic Engineering
- Molecular Biology of infectious diseases
- Immunology and Chronic Viral Infections
- Protein Engineering, Protein Structure, stability and folding
- Biochemical Engineering, Metabolic Engineering and Bioprocess Technology
- Transcription and Human Biology
- Structural Biology and Bioinformatics
- Cell Signalling
- Cancer Biology
- Molecular basis of human viral diseases
- Metagenomics and Environmental Biotechnology
- Biotherapeutics Production
- Molecular Modeling and Cheminformatics
- Plant Molecular Biology and Biotechnology
- Nanobiotechnology, Biosensors
- Bio-conjugation Chemistry

For details about the various programmes, course outline, faculty profile and facilities visit our Website: [http:// www.jnu.ac.in/SBT](http://www.jnu.ac.in/SBT)

Fees to be paid at the time of Admission: Rs.5,000/- for General including OBC & Rs.2500/- for SC,ST,PH (Approx.)

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17. KUMAUN UNIVERSITY, NAINITAL (10 seats) *

The Department of Biotechnology in Kumaun University has been established with the objective to train students in various areas of Biotechnology. This department is funded by DST-FIST and M.Sc. programme is supported by the Department of Biotechnology, Govt. of India and all students admitted receive a stipend of Rs. 3000/- P.M. Students admitted in the 2-year (4 semester) programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. Students of this University are offered conceptual courses like Biochemistry, Microbiology & Industrial applications, Cell & developmental Biology, Biostatistics & Computer science etc. to develop the basic understanding of the subject and core course like Molecular Biology, Genetics, Analytical Techniques, Immunology & immunotechnology and Genomics & Functional Genomics. Besides that they are taught advanced courses like Genetics Engineering, Bioprocess Engineering, IPR& Biosafety and are offered elective courses like Plant Biotechnology, Environmental Biotechnology, Animal Biotechnology and Molecular Virology. The course work has been developed the expertise in the area of specialization and to give more practical and directional approach to the understanding of the subject. The students are required to undertake project/thesis work in their final. semester, which starts from IIIrd Semester. Students also deliver seminars as part of the course curriculum.

The M.Sc. students of the department have high success rate in the competitive examination held for the award of GATE/ DBT/ICMR/JNU/SPM/UGC/CSIR-NET/JRF and are placed at institution of National and International repute.

The department is running at the Bhimtal campus of the University, 20 kilometers downhill of Nainital. The new infrastructure has specific Plant Biotechnology, Biochemistry, Molecular Biology, Algal Biotechnology, Microbiology and Bioinformatics Laboratories etc. other than teaching laboratories. The courses are taught by the faculty of the department as well as by the guest lectures of various experts of specialized areas. The faculty members are actively working of various Biotechnology related projects funded by DBT, CSIR, UCOST and UGC etc. The department has active interaction for both teaching and research with various institutes and universities of repute like CCMB Hyderabad, NIMHANS Bangalore, NCCS Pune, NIMR New Delhi, DIBER Haidwani, DCFR Bhimtal, IVRI Mukteshwar, PDFMD Mukteshwar, G.B. Pant University, Pantnagar, NDRI Kama!, NBRI Lucknow, State council of science and technology, Gangtok, Sikkim. NRCPB Delhi, GBPIHED, Kosi- Katarnal, Almora, VIPKAS Almora, Mody Institute of Technology and Science, Laxmangarh, SikarUttarakhand Council for Biotechnology, Haldi (U.S. Nagar) and Roswell Park Cancer Institute, Buffalo, USA (Under process)etc.

Fees to be paid at the time of Admission: I Semester Rs.16270/- (5000/- caution money), II Semester Rs.11050/-, III Semester Rs.11220/- & IV Semester Rs.11050/-, Govt. Hostels (Boys & Girls) are available at Rs. 16110/- per year excluding food.

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18. UNIVERSITY OF LUCKNOW, LUCKNOW (10 seats)*

Students admitted to the programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. M.Sc. Biotechnology program is supported by Department of Biotechnology (DBT), Govt. of India and is run in the Department of Biochemistry, Lucknow University. This is a 4- semester course with 8 weeks summer training. The course content, in brief, include: Biomolecules and Biopolymers; Biophysical Chemistry and Techniques; Biostatistics and Computer Applications; Enzymology; laboratory Course I; Molecular Cell Biology; Microbiology and Metabolic Processes; Molecular Biology I; Immunology I; Laboratory Course II; Molecular Biology II; Principles of Genetic Engineering; Microbial Technology and Bioprocess Engineering; Immunology II; Laboratory Course III; Plant Biotechnology and Tissue Culture; Animal Biotechnology and Cell Culture; Enzyme and Food Technology; Project work; Two months summer training (Entrepreneurship).. The method of teaching include the combination of lectures and practical/ demonstration by the faculty and guest speakers, seminars, audio-visual presentation, etc.

The Department of Biochemistry is well recognized all over the country for its standard of teaching and research. The department runs M.Sc., Ph.D. and D.Sc. degree programs. The M.Sc. Students of this department have always excelled in the competitive examinations held for the award of Research fellowships at national level-UGC-CSIR NET, GATE, etc.

The Department is collaborating in research activities with the other departments of the University as well as with national organizations, such as Central Drug Research Institute, Indian Institute of Toxicology Research, National Botanical Research Institute, Central Institute of Medicinal and Aromatic Plants, KG Medical University, Lucknow.

The Department has earned recognition in the form of financial support from Rockefeller Foundation, UNESCO, PL480, UGC under Special Assistance and COSIST, DST-FIST and DST PURSE programs. Department also has Bioinformatics Infrastructure Facility (BIF) of DBT and Centre of Excellence in Bioinformatics from U P Govt.

The major research areas of the department include: (1) Plant Biotechnology (2) Metabolic Pathway Engineering (3) Clinical Biochemistry (4) Bioinformatics.

Fees to be paid at the time of Admission: Rs.15000/- per semester + Rs.1000/- Enrolment fee (One time). Hostel charges are extra.

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19. MAHARSHI DAYANAND UNIVERSITY, ROHTAK (15 seats) *

Maharshi Dayanand University is named after the name of a great visionary and social reformer, Maharshi Dayanand. The University is located at Rohtak in the state of Haryana - about 75 kms from Delhi on Delhi-Hisar National Highway (NH- 10).

The University campus, spread over an area of over 665.44 acres, is well laid with state-of-the-art buildings and magnificent road network, and presents a spectacle of harmony in architecture and natural beauty. Educational and research programmes are offered through its 38 teaching departments. There are as many as 10 Teaching Blocks, 22 Hostels, an elegant Vivekananda Library with 6 off-shoots, the majestic Tagore Auditorium equipped with modern gadgetry and amenities, spectacular Students Activities Centre, Campus School, Health Centre, Faculty House, Sports Stadium, Swimming Pool, Multipurpose Gymnasium Hall, Community Centre, Printing Press, Canteens, Shopping Complex and an Administrative Block. There is a very robust Campus Wide Network – an amalgam of cable and Wi-Fi technologies, with 1 Gbps internet connectivity.

Centre for Medical Biotechnology is housed in a three storied building with working area of 9630 square meters on three floors. It has well organized laboratories, classrooms, seminar rooms and conference room. The centre has well established Animal Cell Culture Facility and Central Instrumentation Facility. The Centre is equipped with instruments necessary for advanced research in Biotechnology. Some facilities include: Equipments like – Fermentor, Blotting apparatus, Deep freezers, Potentiostat-Galvanostat, Ice-flaker, IEF Electrophoresis, Gel Documentation system, High-speed Centrifuges, Real -Time PCR, ELISA reader, Nano HPLC, UV-VIS spectrophotometer, Phase contrast Inverted microscope, Aktapurifier etc. This centre also houses a well established bioinformatics facility supported by DBT, Govt of India having its own high and low end servers to cater the need of Centre. The major area of research in the Centre is Insect Genetic Engineering, Virology, Genosensor development, Stem cell technology, Animal cell culture, molecular toxicology etc.

The M.Sc. teaching programme is a two-year (4 semesters) course and follows Choice Based Credit System (CBCS) of the University formulated by DBT expert committee. The CBCS offers hard core, soft core and open elective courses. Projects are the integral part of the CBCS and each student works on a research project for one full semester in one of the following areas. The students also have the option to work for summer training in Post Graduate Medical College, Rohtak or any other premier institute in India for 8 weeks at the end of first year. Major research programs are in the following areas:

- Stem Cell Culture
- Genosensor for infectious disease
- Genomics and Proteomics
- Population genomics
- Molecular virology
- Diagnostics

Fees to be paid at the time of Admission: Rs 10,845/- & Hostel Charges : Rs.10,000/- per annum

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Coordinator
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20. Maharaja Sayajirao University of Baroda (25 seats) *

The Maharaja Sayajirao University of Baroda is India's internationally renowned state residential university established in 1949. The university has 275 acres of campus comprising 14 Faculties (including Fine Arts, Performing Arts), 90 Departments, 3 constituent colleges and several specialized centres and institutes offering wide spectrum of courses from kindergarten to Ph.D.

The Department of Microbiology and Biotechnology Centre was one of the first six centres established for carrying out Postgraduate teaching and research in areas related to Biotechnology, under the support of Department of Biotechnology (DBT), Govt. of India. Students joining the Biotechnology Programme are eligible for the award of degree in M.Sc. Biotechnology on successful completion of the course.

The department has strong base in Microbial and Molecular Technology and is equipped with:

- Infrastructure for very good training in DNA Technology, Genetic Engineering, Molecular Biology, Animal cell culture, Industrial Microbiology, Immunology and Bioinformatics.
- A Bioinformatics Centre – DIC, supported by DBT
- Access to excellent internet facilities.
- An inter departmental central facility for Confocal microscopy, FACS and 2D-proteomics with LCMS
- A library with very good collection of textbooks easily accessible to the students.

The programme is spread over four semesters covering a total of 100 credits. The theoretical and practical training is given in Microbiology, Biochemistry, Genetic Engineering, Developmental Biology, Immunology and some aspects of Biochemical Engineering, Biophysics, Biostatistics, Bioinformatics and Environmental Biotechnology.

Students also work on a research project during the course as a part of the curriculum. The aim is to provide them sufficient experience and proficiency in the methodology of biological research to enable them to carry out independent research. Projects are assigned, as far as possible, according to the individual interests of students, and are carried out in our own laboratories. After submission of their dissertation, the students undergo a viva-voce, in which they have to defend their work.

Students are also required to give one Seminar during their course and submit Project Proposal.

The major research programs are in the following areas:

- Clinical Immunology
- Development of probiotics & Nutraceuticals
- Enzyme Technology
- Genome Analysis
- Host – Bacterial interactions in disease
- Macrophage - Bacterial interactions
- Molecular aspects of Bacterial Pathogenicity
- Molecular Microbiology
- Plant Microbe Interactions
- Antimicrobial Resistance

Fees to be paid at the time of Admission: Boys –Rs.10,000/- Girls – 8500/-

Hostel accommodation: Additional Rs.7000/-. Hostel accommodation will be provided to boys and girls subject to availability.

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21. UNIVERSITY OF MYSORE, MYSORE (10 seats) *

The University of Mysore (UOM) is the sixth oldest university in India. The university is reaccredited for the third time with a score of 3.47 out of 4.00 by NAAC. UOM is recognized by the Ministry of Human Resource and Development/ UGC, Government of India as an Institution of Excellence and awarded Rs.100 crores. Under this programme the university has set up a Centre of Excellence in "Biodiversity, Bioprospecting and Sustainable Development". This centre is equipped with MALDI-GC-LC-MS/ MS, NMR, XRD, Confocal microscope, SEM, Fluorescent microscope, Polarizing microscope, Live cell imaging system, DNA sequences, Multimode plate reader, Flow cytometer, Ultracentrifuge, High speed centrifuge, Fermenters & Bioreactors, Water purification system, Vacuum concentrator, Freeze driers, Ultrafreezers, Biosafety cabinets etc. UGC has recognized this university as University Potential for Excellence (UPE) and granted Rs. 60 crores. DST has recognized this university under Promotion of University Research and Scientific Excellence (PURSE) with a grant of Rs. 9 crores.

M.Sc. Biotechnology is a four- semester (CBCS) programme offered by the Department of Studies in Biotechnology. The course content covers theoretical and practical training in Biophysics and structural biology, Bioanalytical techniques, Bioprocess technology, Molecular genetics, Food & environmental biotechnology, Advanced molecular biology, Gene technology, Biostatistics & Bioinformatics, Molecular biodiversity, Immunotechnology, Cell signaling & communication, Plant biotechnology and Animal biotechnology. The students have to undertake a project work in the fourth semester.

The major thrust areas of research at the department include Plant and microbial biotechnology, Molecular Plant Pathology, Biopesticides, Mycotoxins, Cancer Biology, Biomarkers, Molecular biodiversity and Bioprospecting. The Department is supported by UGC- SAP-DSA, COSIST, DST-FIST, ICAR, DBT-HRD, DBT Indo-German and European Union Programmes. The faculty members are having competitive grants from national and international agencies. The Department has established a Seed Health Center for Asian region with DANIDA support. Good infrastructure has been established at the department for teaching and research.

Fees to be paid at the time of Admission/Registration: Rs.20,000/-.

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22. UNIVERSITY OF NORTH BENGAL, SILIGURI (10 seats) *

Students admitted to the four-semester (two-year) programme (as per DBT, GoI, prescribed syllabus) of the Department of Biotechnology, University of North Bengal, are eligible for the award of M.Sc degree in Biotechnology on successful completion of the course. Growing with the years, the department has acquired critical expertise in transforming learners of the M.Sc in Biotechnology to future human resources of high quality Science and Technology Institutes of India and abroad. Five salient points of the University's M.Sc program in Biotechnology are: (i) One-to -one teacher -student (teacher student ratio: approx. 1 : 1) interactive and remedial session; (ii) Monitoring and mentoring of individual student to transcend; (iii) exposure to independent hands-on practical connected to a step-up ascent in methods involved to uncover a research problem identified afresh in the respective practical classes; (iv) In-house dissertation projects, beginning from the third semester, as per students' choice, in the fields of biomedical technology, enzyme biotechnology, bioinformatics, agricultural biotechnology, fungal biotechnology, high-throughput biology, phytochemistry, plant biotechnology, animal cell culture, nanobiotechnology, and microbial biotechnology ; and (iv) strong emphasis on learning by doing, holding regular journal club (integral part of the curriculum), presentation of cutting-edge research findings and entrepreneurial projects by students. A PhD level course- work and training program in research design has been developed to recruit highly qualified and motivated PhD students and post-doctoral associates in genomics-proteomics-metabolomics-resistome research programs supported through various extramural funding by CSIR, DBT, UGC, DST etc. and industrial contributions. The department currently provides strong research ties between NBU-department of Biotechnology and different National and international Research Institutes, and Universities.

The steady increase in the quality of publications by the core faculty members of the department is an important index of vibrant intellectual environment. The profile of the sent-out post-graduates pursuing Ph.D as well as post-Ph.D research in internationally recognized centres of higher learning and research , and the quanta of qualifiers in National eligibility tests (NET, GATE, DBT-BET, ICMR) are the main reasons why students qualifying combined entrance examination are attracted to get admitted to M.Sc Biotechnology program of the University of North Bengal.

Fees to be paid at the time of Admission: Rs.2878/- (Approx.)

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 biotechnologynbu@gmail.com

23. NORTH EASTERN HILL UNIVERSITY, SHILLONG (10 seats) *

North Eastern Hill University was set up by an Act of Parliament and notified on 19th July 1973. The objectives of the University, as laid down in the acts, are “to disseminate and advance knowledge by providing instructional and research facilities in such branches of learning as it may deem fit; to pay special attention to the improvement of the social and economic conditions and welfare of the people of the hill areas of the North-eastern region, and in particular, the intellectual, academic and cultural advancement”.

All Departments of the University are housed in the buildings on the permanent campus. Now we have high speed internet connectivity to which all the departments located on the campus are linked. The BSNL has set up a fully automated telephone exchange in the campus. In a short span of 36 years, NEHU has matured into an institution with a proven academic excellence of higher learning and research learning and research, social commitment and cultural interest with a clear vision for its future growth. In the year 2006, it was chosen as a ‘University with Potential for Excellence’ by the University Grants Commission (UGC). It has been able to attract persons of proven academic excellence from almost all parts of the country to serve on its faculty; the present faculty strength is 342. Its student community is drawn not only from different part of the north-east region but also from other regions of the country and abroad.

Department started: Year 2005
 Number of faculty: 7 (seven)
 Course Offered: M.Sc. (Biotechnology), and Ph.D.
 Received support: DBT for M.Sc. (Biotechnology) teaching Programme from 2007; DST-FIST; UGC-SAP, 2015; R&D Project- six projects per year (approx);

UGC-NET/GATE/DBT-JRF: Six students per year (approx.)

Fees to be paid at the time of Admission: Rs.4500/- (Approx.)

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24. PONDICHERRY UNIVERSITY, PONDICHERRY (23 seats)*

Pondicherry University offers M. Sc. Biotechnology since 1993 through DBT - Pondicherry University PG programme. It is a two year programme with Choice based credit system where the students are at liberty to choose courses of their interest in consultation with the Faculty Advisor. Students are encouraged to opt for a limited number of hard and soft core courses offered by other Departments of the University to meet their ambition.

Courses that are offered during programme include Microbiology, Biochemistry, Cell and Molecular Biology, Molecular Genetics, Applied and Industrial Microbiology, Molecular Plant Breeding, Immunology, Plant Biotechnology, Marine Biotechnology, Animal Biotechnology, r-DNA Technology, Immunotechnology, Proteomics and Genomics, Bioprocess Technology, Radiation Biology, Bioinformatics, Microbial Biotechnology, Medical Biotechnology and Pharmaceutical Biotechnology. During summer vacation the students are encouraged to undergo a 6-weeks training programme in any of the reputed National Laboratories/Universities/Industries in India. Besides credit seminar(s), the students are expected to do a dissertation in second year spanning two semesters.

The Department is equipped with instruments necessary for advanced research in Biotechnology. Some of the equipments and facility available are Bioreactor, Blotting apparatus, Deep freezers, Ice-flaker, TG and IEF Electrophoresis, Gel Documentation system, High-speed Centrifuges, Real-Time PCR, ELISA reader, Gas Chromatography, HPLC, LCMS, Lypophilizer, UV-VIS spectrophotometer, Nano Drop Spectrometer, Phase contrast and fluorescence microscope, Inverted microscope, Flow-cytometer, Sonicator, Microplate Luminometer, Spectrofluorimeter, Plant Tissue culture facility, Marine Animal house, Animal cell culture facility, Biosafety facility and Central Animal House facility.

The Department receives financial support from National (DBT, DST, UGC, CSIR, ICMR, AICTE, MOES and DAE). The Department also has recognition through DST-FIST and UGC-SAP programmes and Academia-Industry partnership programmes funded by DST.

Major research programmes of the Department are as follows:

1. Bioactive molecules from microbes plants and animals
2. Synthesis and characterization of nanoparticles
3. Crop improvement through genetic engineering and marker assisted breeding
4. Application of probiotics in aquaculture and food processing industries
5. Quorum sensing in bacteria-host interactions and role of cell adhesion molecules in bacterial pathogenesis
6. Protein engineering
7. Hematopoietic stem cell biology
8. Fungal Biotechnology

9. Scientific validation and standardization of AYUSH Drugs.

Fees to be paid at the time of Admission:

Tuition Fees: Rs. 18100/-(approx)

Hostel Fees: Rs. 4900/-(approx) per semester

Contact Address:

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25. SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE (20 seats) *

The Department of Biotechnology of Savitribai Phule Pune University is a well-established Centre for teaching and research in biotechnology and related areas. It started in 1985 along with a few first centres supported by DBT, New Delhi.

Students admitted to the programme are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course. There are 94 credits (as per DBT M.Sc. Biotechnology syllabus, 2017) to be completed by a student. In addition to this our University offers mandatory fulfilment of 10 credits divided in 4 semesters and related to various courses including Cyber Information/Security, Human Rights Education, Skill Development, etc. The main thrust areas of the centre are quantitative aspects in Biology. Students are offered core courses in Biochemistry, Cell and Molecular Biology, Plant and Animal Biotechnology, Microbiology, Genetics, Basics of Mathematics and Statistics, Genetic Engineering, Immunology, Bioinformatics, Genomics and Proteomics, Molecular Diagnostics, Research Methodology and Scientific Communication Skills along with Seminar presentations in the first two semesters. In the third semesters, more specialized and advanced courses, namely Bioprocess Engineering and Technology, Emerging Technologies, Bioentrepreneurship, Intellectual Property Rights, Biosafety and Bioethics are offered. In addition to this students are evaluated for their Project Proposal Preparation and Presentation, Critical Analysis of Classical as well as Recent Advances through seminar presentations. The fourth semester includes an Elective Course and a Research Dissertation.

The department has in-house faculty strength of two Professors, **four** Assistant Professors, **three** UGC-FRP, 3 Teaching Research Associates. In addition, there are 24 Adjunct Faculty from NCL, NCCS, IISER, NIV, ARI etc who contribute to our teaching and research programme. The Department has well established state-of-art teaching and research laboratories. A number of Ph.D. and Post doctoral students work in various research programmes of the Department which are as follows:

1. Pathophysiology of Cancer, diabetes and, leishmaniasis etc.
2. Applications of computational tools for SAR, drug design, modelling, etc.
3. Cancer epigenetics & Proteomics.
4. Bioremediation of heavy metals and halogenated compounds at molecular level
5. Nanobiotechnology, live cell imaging etc.
6. Epigenetic studies on micronutrient deficient diabetic subjects and effects of stress and depression on brain.
7. Regulation of insulin/insulin like growth factor signaling in mammalian brain by chaperons.
8. Hypoxia, angiogenesis & Tumor progression
9. Natural Product & Drug Development

For further details including syllabus, our website ([www.unipune.ac.in/Department of Biotechnology](http://www.unipune.ac.in/Department%20of%20Biotechnology)) may be visited.

Tentative fees to be paid at the time of Admission: Rs. 26,500/- (Approx.). Please note the amount may change as per SPPU rules.

Contact Address:

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26. SARDAR PATEL UNIVERSITY, ANAND, GUJARAT (10 seats) *

Students admitted to the programme are eligible for the award of M.Sc degree in Industrial Biotechnology on successful completion of the course. Under the Choice based Credit System (CBCS) introduced in the department from 2011, there are 100 credits to be completed. The Bhanuben Ratilal Doshi (B R Doshi) school of Biosciences is a renowned state university situated close to the milk city

Anand. The department has nurtured and developed a strong emphasis on basic and applied research in diverse areas of Biology. The department is nationally and internationally recognized for its contributions in research the areas of Environmental Biotechnology, Plant morphogenesis, Microbial technology, Biodiversity; plant Biotechnology, herbal medicines and human diseases.

The department also runs five other post-graduate courses such as Biochemistry, Botany, Biotechnology, Microbiology and Zoology. The DBT sponsored Industrial Biotechnology programme is spread over four semesters. The first three semesters comprise of three core and one elective paper and two practical courses in each semester. In the fourth semester, along with two core papers, a dissertation or research project is to be carried out by the students. The dissertation is an independent, credit based research work carried out under the supervision of a faculty member as a partial requirement for the M.Sc degree. The core as well as elective papers offered include: Molecular Biology, Bioinstrumentation, Cell Biology and genetics, Biostatistics, Transport processes and downstream processing, Bioprocess and biochemical Engineering, Genetic Engineering and Bioinformatics, Microbial technology, Enzymology, Immunology, Environmental Biotechnology and Plant and animal Biotechnology.

These courses are being taught by experienced faculties of the department as well renowned regular visiting faculties. The department at present has 15 permanent faculty members and two ad-hoc faculties. All the faculty members are actively engaged in research supported by various governmental and industrial sponsors such as UGC, DST, CSIR, DBT, ICAR, MoE, DRDO, GSBTM, NDDDB, BASF etc. In addition to these individual projects the department has received grants under UGC-SAP, UGC-COSIST and DST-FIST.

Fees to be paid at the time of Admission: Rs. 6550/- (Approx.) per semester

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27. SHIVAJI UNIVERSITY, KOLHAPUR (10 seats) *

Shivaji University, Kolhapur named after the great Maratha Warrior Chhatrapati Shivaji, was established in 1962 at Kolhapur (Maharashtra). Currently the University is ranked 28th in the MHRD NIRF ranking and accredited with a 'A' grade from NAAC Students admitted to the programme are eligible for the award of M.Sc. Environmental Biotechnology on successful completion of the four-semester course under CBCS introduced in the University from 2013. This course was started in 2006 at Department of Biochemistry which includes training in-Cell Biology, Microbiology and Virology, Proteins (Structure and Functions), Biomolecules, Biostatistics and Bioinformatics with Computer Orientation, Enzymology, Molecular Biology, Bioenergetics, Tools and Techniques in Bioscience, Genetic Engineering, Immunochemistry, Fermentation Technology, along with Basics of Ecology, Ecotoxicology and Eco chemistry, Environmental Pollution and Control, Environmental Biotechnology, Biodiversity, IPR, Biosafety & Bioethics etc.

Student has to complete 96 credits (Theory courses: 64 credits and Practical/Project/ Seminar/ Scientific Paper Writing: 32 credits). Students also have a choice to take some of the courses from other departments of the University.

This centre is equipped with UV- Vis, IR, GC, HPLC, HPTLC, Gel Documentation system, PCR, RTPCR, DGGE, TGGE and DNA Sequencer etc. along with all basic facility required in Plant tissue culture, Animal Tissue Culture, Enzymology and Bioinformatics.

The research thrust areas of the Department includes Biotransformation, Microbial and Phytoremediation (Textile Dyes and xenobiotics), Bioinformatics, Molecular Modelling/ Computational Biochemistry, Ayurvedic drugs and its biochemical action, Diabetes mellitus, Biodiversity, identification, DNA barcoding and Bioprospecting of Medicinal plants, Molecular community dynamics in rhizosphere of textile dye contaminated ecosystems and genetically modified microorganisms for dye degradation.

Department also offers M. Sc. and PhD. courses in the Biochemistry and one year Post Graduate Diploma in Bioinformatics. Biochemistry department has been recognized by Department of Science and Technology through its FIST, University Grants Commission through SAP-DSR-I programme and is also actively involved in DBT-IPLS and DST-PURSE programmes sanctioned to Shivaji University, Kolhapur. This Department is recognized for its textile dye degradation studies in the International community.

Fees to be paid at the time of Admission: Rs. 13,000/-

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28. TEZPUR UNIVERSITY, TEZPUR (ASSAM) (20 seats) *

The Department of Molecular Biology and Biotechnology (MBBT), Tezpur University was established on 24th of July 1997. The Department started offering a two-year M.Sc. programme in Molecular Biology and Biotechnology since inception. Besides this the Department is also currently offering Ph.D. in Molecular Biology and Biotechnology as well as a 5-year Integrated dual B.Sc.- M.Sc. in Life Sciences. Students passing out from this Department are able to secure admission into the PhD programme of various reputed research institutions such as IISc, NCBS, CCMB, NII, NBRC, NIPGR, IGIB, NCCS, NIBMG, IMTECH, etc. Over the years the Department has substantially contributed to the development of trained manpower in different fields of biotechnology and molecular biology, which has placed the Department among the leading centers of learning and research in the country.

The current faculty strength of the Department is nineteen, with diverse research specialization. The Department laboratories are well equipped with advanced instrumentation facilities (e.g. DNA sequencer, Real- Time PCR, HPLC, Bioanalyzer, Spectrofluorimeter, Immunofluorescence microscope, GC-MS etc.) and are supplemented by the instruments available at the Sophisticated Analytical Instrumentation Centre (SAIC) of the University. The Department has been following the DBT recommended M.Sc. General Biotechnology syllabus, since July 2011.

The final semester students participate in research projects in any one of the ongoing research areas of the Department that include Genetics Diseases (Cancer, Malaria, Eye, Diabetes, etc.), Evolutionary Genetics, Molecular Toxinology, Molecular Immunology and Immunogenetics, Plant-Microbe Interactions, Venom Biochemistry, Nanobiotechnology, Bioinformatics and Computational Biology, Environmental Biotechnology, Food Microbiology, Industrial Microbiology, Enzyme Technology, Bioremediation, Microbial Enhanced Oil Recovery, Protein Chemistry, Drug Discovery from natural products.

The University has also introduced Choice Based Credit Transfer (CBCT) that enables the students to enrol for credit course in each semester, of their choice, thereby enabling them to opt for the multidisciplinary courses. Details on faculty profiles, research interests and infrastructure facilities can be viewed at our website: <http://www.tezu.ernet.in/dmbbt/index.htm>

Fees to be paid at the time of Admission: Rs.20,203/- for admission to Semester I and **Rs.11403/-** (approx) for subsequent semesters. Detail of the fees (including medical insurance, Hostel admission and refundable caution deposits) can be found in the Tezpur University Prospectus.

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*** Number of seats is subject to revision by the Department of Biotechnology, Government of India.**

29. UTKAL UNIVERSITY, BHUBANESWAR (10 seats) *

Utkal University established in the Year 1943 accredited by NAAC (A+) and is also declared Category-I University by MHRD. It is the seventeenth oldest University in India. Its present campus at Vani Vihar, Bhubaneswar is located on a sprawling 399.9 acre area in the heart of Bhubaneswar, the Capital city of Odisha. P.G. Department of Biotechnology is established in the year 2002 and the M.Sc. Biotechnology Teaching Programme is supported by the Department of Biotechnology, Govt. of India, New Delhi. Students admitted to the Teaching programme of the Department are eligible for the award of M.Sc. Degree in Biotechnology on successful completion of the Course.

Eligibility Criteria: Bachelor's Degree under 10+2+3 pattern of Education in Physical or, Biological Sciences with at least 55% marks in aggregate or, as decided by the Department of Biotechnology, Govt. of India, New Delhi from time to time.

M.Sc. Biotechnology Programme is a four semesters (two years) teaching programme offered through semester choice based credit system adopting UGC guidelines. Under this system students have flexibility to take some courses/credit hours in 3rd/4th semester in the related or cross disciplinary areas from related P.G. Departments of the University. The Course curriculum has been designed to impart theoretical and practical training to the students in Cell Biology and Genetics, Biochemistry, Microbial Physiology and Genetics, Biotechniques, Molecular Biology, Environmental Biotechnology, IPR & Bio-safety, Immunology, Plant Biotechnology, Biostatistics and Bioinformatics in the first two Semesters. In 3rd Semester more specialized and advanced courses i.e., Genetic Engineering, Animal Biotechnology, Enzyme and Bioprocess Technology are offered. In 4th Semester the students shall have to undertake an extensive project work for a period of six months with an aim to have laboratory exposure and proficiency in the methodology of Biological Research. Student Seminar is also an integral part of the course curriculum. The Department has active interaction in teaching and research with various Departments of the University and a number of National Institutes in and around Bhubaneswar. The Department is having well established and equipped research laboratories through fundings from the DBT, Govt. of India, DST, Govt. of India, ICMR, DAE (BARC), UGC, Central Council for Research in Homeopathy (CCRH), Ministry of AYUSH, Govt. of India and State-DST etc. The Department is also under DST-PURSE Programme. The M.Sc. Biotechnology course is taught by the core faculties and eminent visiting faculty. Students of this Department have always excelled in various competitive examinations held for the award of Research fellowships at National level i.e., UGC-CSIR NET, GATE, DBT-JRF, ICMR-JRF and carrying out research in reputed Institutes and

Universities in India. The Alumni of the Department are well placed in reputed Research Institutes in India and Abroad. The Department is currently pursuing research activities in the following areas.

- Redox homeostasis; Endocrine disruptions and Epigenetic modifications.
- Pharmacological screening of Bioresources for Therapeutic Interventions.
- Development of biopolymeric scaffolds and Nano medicines.

Infrastructure facilities : Student Laboratory, Research Laboratory, Library, Computers, Internet facility and equipments such as UV-Visible spectrophotometer, Microplate (ELISA) Reader, Microplate Spectrophotometer, Spectrofluorimeter, Chemi Doc. System, Orbital shaker incubator, High speed refrigerated centrifuge, Gel Electrophoresis, Blotting System, Gel Doc. System, Thermal Cycler (PCR), -80°C, -50°C & -20°C Deep freezers, Hybridization oven, Sonicator, Research Microscopes, Fermenter, Millipore water purification system, Cold room, Power backup system, Oxygraph, Microscope with digital camera attachment and Microtome for histochemical studies are available in this Department. Besides the above facilities, Department has developed cell culture facilities with Biosafety Cabinet(Level-II), CO₂ Incubator and also has procured sophisticated equipments like Real Time PCR, High Performance Liquid Chromatography (HPLC) system and Fluorescence Microscope.

The University has established Central Instrumentation facility through Centre of Excellence in Integrated Omics and Computational Biology (COE-IOCB) and Centre for Environment, Climate Change and Public Health facilitating National and International collaborations for Academic and Research Exchange.

For detail information please visit University/Department website: www.utkaluniversity.nic.in

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30. VISVA-BHARATI UNIVERSITY, SANTINIKETAN (17 Seats) *

Visva-Bharati at Santiniketan, founded by Nobel Prize (literature) winner and great poet Rabindranath Tagore, is a Central University of National importance since 1951. Santiniketan is located about 150 km north of Kolkata in the Bolpur town of West Bengal among natural and scenic environment. It is a major attraction that is visited by tourists from all over the world. Bolpur station is easily connected by many express trains (~3 - 4 hours) from the three trains stations in Kolkata (Howrah, Sealdah and Kolkata stations) and Burdwan station. M.Sc. Biotechnology program was started in this University in the year 1997 and from 2004 it is supported by the Department of Biotechnology, Government of India. Students admitted to the program are eligible for the award of M.Sc. degree in Biotechnology on successful completion of the course in 4 semesters (2 years duration). The primary objective of the department is to impart advanced knowledge in various cutting edge areas of modern biotechnology through class room and hands-on practical/research training so that the students feel themselves adequate, self-sufficient and confident.

The first three semesters each have four theory and one laboratory courses with a provision of summer training for 4 to 6 weeks in any Institute/University of choice in India at the end of the 2nd semester. In the 4th semester there are two theory and one laboratory courses. In addition, each student carry out a project work which sometimes lead to scientific publication, under the careful supervision of a faculty of the Department. The project work is spread over the 3rd and 4th semesters and is evaluated at the end of the 4th semester. The entire course carries 96 credits. The courses of the first two semesters are designed with the objective to strengthen the basic concepts of Biotechnology. These courses are Cell Biology, Biochemistry, Genetics & Molecular Biology, Biotechniques, Microbiology, Immunology, Virology, Computer applications, Biostatistics and relevant laboratory courses. The 3rd and 4th semester offer theory courses in the applied aspects of biotechnology such as Animal biotechnology, Plant biotechnology, Genetic engineering, Bioprocess engineering, Bioinformatics, Bioethics and IPR, Environmental Biotechnology, Biosafety, Research methodologies, Emerging technologies, Bioentrepreneurship etc. in addition to the relevant laboratory courses. In addition, one paper in the fourth semester has been devoted to student seminar on high-impact classical papers. All students are also required to present talks on recent advances in Biotechnology in weekly seminars, beginning right in the first semester, which are also evaluated. Guest lectures are organized, inviting scientists from other Institutions/Universities to strengthen the academic and business/commercial exposure of the students. The department also encourages visits of the students to institutes having research &/or commercial activities of various kinds. The department has computer and wi-fi internet facility in the class rooms and a departmental well-stocked library in addition to a well established Central library, for academic uses by the students. The teachers very actively encourage and support students to appear for various competitive exams such as NET, GATE, DBT-JRF etc. and every year several students succeed in these exams. The department also has a vibrant PhD program with many students engaged in cutting edge research under different faculty members who have garnered large amounts of research grants from various funding agencies (e.g. by DBT, DST, UGC, CSIR etc.) and published more than 100 research articles in national/international journals of repute in the last five - six years.

The Department has seven permanent faculty for the M.Sc. Biotechnology course; all the faculty members have substantial research exposure abroad which strengthens the departmental teaching profile to a great extent. Some of them also have collaboration with National and International Institutes/Universities. The Department has received financial supports through DST-FIST program, DBT-HRD program, UGC and the University itself. Many state-of-the-art instruments (e.g. Flow cytometer, HPLC, -80°C deep freezers, Imaging system, Fluorescence and Nanodrop and UV-VIS Spectrophotometers, Incubators, Cold centrifuges, ELISA reader, PCR machines etc.) have been purchased with funds from various sources. Proposals are also there for the purchase of a common DNA synthesis & sequencing facility. Priority areas of research work of the faculty are following: Tumor Virology, Parasitic Immunology, Cancer Biology, Plant Bioactive compounds, Cloning and characterization of carbohydrate splitting enzymes, Ageing mediated damage to cellular macromolecules and their modulation, Genomics & transcriptomics of plant-pathogen interactions, Abiotic stress responses in plants etc.

Further details about the University, faculty profiles and their academic interests can be viewed at our website: <http://www.visvabharati.ac.in>

Fees to be paid at the time of Admission : Approx. Rs. 7500/- (Indicates 2018-2019 fees; Amount shown included first year tuition fees and did not include hostel and mess charges)

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31. Jiwaji University, Gwalior (10 seats)*

The School of Studies in Neuroscience, Jiwaji University, Gwalior, offers a platform for research and teaching towards understanding the structure and function of the brain. This is the first and only Post-Graduate Department in Indian Universities extending interdisciplinary and inter-Institutional training to students leading to the award of M.Sc. Neuroscience degree. The M.Sc. Neuroscience teaching programme takes care of the basic disciplines such as Cell biology, biochemistry, cell and molecular biology, genetics, laboratory tools and techniques, etc. which provide a broad base during the first semester. This is followed by gradually specialized areas of neuroscience like neuroanatomy, neurochemistry, molecular neurobiology, genetics, neuroimmunology, developmental neurobiology, degeneration and regeneration of nervous system, systems neuroscience, learning, memory and cognition, clinical neurochemistry, nanotechnology, bioinformatics, tools, techniques and methods in neurobiology research. Generous financial support from the Department of Biotechnology, Department of Science & Technology, Council of Scientific and Industrial Research, Indian Council of Medical Research, University Grants Commission and other agencies during past 25 years and strong academic backup and support from distinguished neuroscientists of national and international stature have allowed us to develop a research centre which one can boast of. We have successfully executed several major research projects, organized training workshops for research scientists and University and college teachers, symposia and conferences of National and International level. The School is well equipped with modern instrumentation as well as a good library. Our neuroscientists have been trained in leading Institutes in India and abroad. In order to inculcate research skills in our students, in addition to their training at our research laboratory they get an exposure by way of project work/ training for about 6 months. We also make special efforts to promote an excellent general education that would provide the basis for careers in other areas such as teaching, commerce, and administration and management. We also organize lectures and Professional Development Workshops for which Prof. Thomas D. Albright (California, USA), Prof. Kregelberg (Newark, USA), Prof. Michael J. Zigmond and Prof. Beth Fischer (Pittsburgh, USA) and several senior faculties from Indian Universities were invited. Objective of the Course: The M.Sc. programme has been designed to prepare students for: (1) neuroscience research oriented positions in academia and industry, (2) careers at the interface of the bench and bedside in the academic neuroscience or (3) even in the application oriented biomedical industry.

Course Structure: The students with a M.Sc. degree in Neuroscience would have acquired the basic knowledge in major disciplines of the subject such as neuroanatomy, neurophysiology, neurochemistry, molecular neurobiology, neurogenetics and the working of motor, sensory and regulatory systems. The development and regeneration of the brain as well as the knowledge in basics of clinical neuroscience in terms of diseases and diagnostic tools would also be provided. They would also acquire practical training in the above aspects as well as in research methodology and computational skills. **Teaching Methods:** The course is completed in a truly interdisciplinary and inter-Institutional mode. A variety of teaching methods are adopted including interactive lectures and seminars, group work, practical classes, computer based exercises as well as external visits to hospitals, Laboratories, Institutes, etc. **Eligibility:** Graduation with 50% marks with one or two of the following subjects: Biology/ Biotechnology/ Biochemistry/ Neurobiology/ Neuroscience/ Zoology. In addition veterinary science, MBBS and B.Tech (Biotech) and BE (Biotech) graduates shall also be eligible. **Benefits for reservation** as per Madhya Pradesh and University rules. **Scope for placement:** M.Sc. Neuroscience programme has been designed to train students for neuroscience research oriented positions in Universities/Institutes/ R&D Units of Pharmaceutical Companies engaged in production of neuropharmacological products and diagnostics, in India and abroad.

Fees for the course: Open Seat

Course	I Semester	II Semester	III Semester	IV Semester
M.Sc. Neuroscience	Rs. 8815.00	Rs. 4425.00	Rs. 5775.00	Rs. 4425.00

Contact Person: Prof. P. K. Tiwari
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 Mob : 9425712787, 9425110063
 Web site : www.jiwaji.edu, www.neuroscienceju.com

32. Sri Padmavathi Mahila Vishvavidyalayam (Women University), Tirupati (19 seats)*

Sri Padmavathi Mahila Vishvavidyalayam, (Women's University) accredited with NAAC "A" Grade was founded in the temple town of Tirupati in 1983 by Sri.N.T.Rama Rao, the then chief Minister of Andhra Pradesh, to face the social challenges of 21st century for the self development and empowerment of women through access to education, particularly higher education in varied disciplines.

Department of Biotechnology was established during 2002-2003 to provide an avenue for girl students to pursue a job oriented post graduation course in Biotechnology. In addition to this, the Department also offers M.Sc. Integrated Biotechnology (regular course) and a certificate course in "Analytical techniques" (through Distance Mode) . These courses ensure proper and complete technical and industrial training for students to take up jobs or to pursue higher studies or to become entrepreneurs with confidence.

The Department has well equipped laboratories and infrastructure to allow and encourage the students to undertake research in specialized areas of Biotechnology. To impart individual hands-on training, the department utilizes various other laboratory facilities established by the university under DST-CURIE, DBT-BIF centre, DST-FIST, UGC-SAP, etc.

M.Sc. BIOTECHNOLOGY: DBT Sponsored (Since 2003)

Duration : Two years (Four Semesters) - Choice Based Credit System
 No. of seats : 20(15 + 5 (30%) extra)
 Eligibility : Bachelor's Degree with group aggregate of 50% with Chemistry/Biochemistry/Botany/Zoology/Biotechnology/ Microbiology/Genetics/Medical Lab Technology/Applied Nutrition/ Bioinformatics and Computer Applications/B.Tech Biotechnology/B.Tech Industrial Biotechnology/ B.Sc Nursing.

Fee to be paid : Rs. 31,125/-per Annum (Hostel Fee Extra)

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II. ELIGIBILITY

Bachelor's degree under 10+2+3 pattern of education in Physical, Biological, Agricultural, Veterinary and Fishery Sciences, Pharmacy, Engineering/Technology, 4-years B.Sc. (Physician Assistant Course); OR Medicine (MBBS) OR B.D.S. with at least 55% marks.

IMPORTANT NOTES: Before applying, please ensure that you fulfil the eligibility requirements as prescribed above. Also please note that permission to appear in the entrance examination is subject to your fulfilling the minimum eligibility requirements prescribed above. You may, therefore, appear in the entrance examination only if you fulfil the eligibility requirements for M.Sc. Biotechnology Program. Despite this caution, in case you do not meet the minimum eligibility criteria and still appear in the entrance examination, you will do so at your own risk and cost, and if at any stage, it is found that you do not fulfil the minimum eligibility requirements, the admission, if granted to you, shall be cancelled ipso facto.

III. ELIGIBILITY OF CANDIDATES WHO ARE DUE TO APPEAR IN THE QUALIFYING EXAMINATION

The candidates who are due to appear in the respective qualifying examination prescribed as eligibility for admission shall also be considered for appearing in the entrance examination. Such of the candidates will be allowed to appear in the entrance examination **at their own risk and on the clear stipulation that in the event of their selection, they will be entitled to admission only if they secure the minimum prescribed percentage of marks in their qualifying degree examination** and that they will be required to submit all the documents including final mark-sheet of the qualifying examination (indicating the final and overall percentage of marks) before the deadline for admission fixed by the concerned participating University.

IV. SCHOLARSHIPS

Students selected for admission to M.Sc. Biotechnology Program of the participating Universities will be eligible to receive scholarship at the rate of Rs.5000/- p.m.

V. RESERVATION/CONCESSION

- (a) Upto 22.5 per cent (15% for SC and 7.5% for ST) of seats are reserved for SC/ST candidates respectively. As per the provisions of Rights of Persons with Disabilities Act, 2016, not less than five percent (5%) seats are reserved for Persons with Benchmark Disabilities, where "person with benchmark disability" means a person with not less than forty percent (40%) of a specified disability where specified disability has not been defined in measurable terms and includes a person with disability, as certified by the certifying authority. 27% seats are reserved for OBC candidates (non-creamy layer). The persons belonging to EWS who are not covered under the scheme of reservation for SCs, STs and OBCs shall get 10% reservation in admission, wherever applicable, will be implemented as per the policy of each participating university.
- (b) **Concession for Kashmiri Migrants:** 10% marks will be added to the overall marks scored by a Kashmiri migrant candidate in the Entrance Examination. After adding 10% marks, in case he/she is covered in the cut-off point in the merit list, he/she will be offered admission strictly in accordance with his/her inter-se merit alongwith other candidates subject to his/her meeting the minimum prescribed eligibility requirements and also subject to his/her producing valid registration documents issued by the notified authorities certifying the candidate's Kashmiri Migrant status.

VI. GUIDELINES/COURSE OUTLINES FOR ENTRANCE EXAMINATION

The question paper for the Entrance Examination will be of three hours duration and divided into two parts:

Part -A will have multiple choice type questions at the level of 10+2 in the subjects: **Physics, Chemistry, Mathematics and Biology. The Candidates will be required to attempt 60 questions:** Total marks for Part A will be (60 questions x 1 mark each) of 60 marks.

Part-B will also have multiple-choice questions of Bachelor's level requiring thinking and analysis. **There will be questions from Physics, Mathematics, Biology (e.g., Botany, Zoology, Biochemistry, Microbiology, Genetics and Molecular Biology) and Chemistry.** The candidates will be required to attempt 60 questions. Total marks for Part B will be 60 questions x3 marks each = 180 marks.

VII. PREVIOUS YEARS' QUESTION PAPERS

For the reference of intending candidates, a set of question papers pertaining to the last three years are available on JNU website www.jnu.ac.in.

VIII. SELECTION PROCEDURE

The selection will depend strictly on the basis of inter- se merit of the candidate in the Entrance Examination vis-a-vis preferences for joining the Universities indicated by the candidate. **In case a candidate has not indicated his/her choice for joining a particular University, his/her name will not be considered for that University.**

The Selection procedure will be as follows:

- 1) After the merit list is drawn more than double the number of candidates than the total intake only will be informed of their merit rank in the entrance examination. The candidates will also be informed about the total number of seats in each participating University. The candidates will be asked to exercise their options through online mode for joining the Universities. The candidates will be asked to pay through online mode an amount of Rs.5,000/- (Rs.2,500/- in the case of SC, ST, PWD candidates) **as initial security deposit** giving their willingness to be considered for admission to the participating Universities in accordance with their options for joining the universities vis-à-vis their inter-se merit in the Entrance Examination. **ALL CANDIDATES ARE ADVISED TO CHECK THE RESULT ON THE WEB SITE OF THE UNIVERSITY (www.jnu.ac.in) IN THE SECOND WEEK OF JUNE.**
- 2) The candidates who do not exercise their options for joining any of the participating universities will not be considered for admission to that university/universities.
- 3) After allotment of seats, the JNU will send intimation to the candidates about their allotment of the university and also to the concerned participating university to which the candidate has been selected. Please note that once allotment of University is made on the basis of inter se merit vis-à-vis options, other options of the Universities given by the candidate shall stand frozen. **CANDIDATES ARE ADVISED TO CHECK THE ALLOTMENT OF UNIVERSITY ON THE WEB SITE OF THE UNIVERSITY (www.jnu.ac.in) IN THE FIRST WEEK OF JULY.**
- 4) The participating university will then inform the candidate about the complete admission procedure and schedule of their university as well as the amount of fee etc. to be deposited by the candidate. The initial security deposit already sent by the candidate through demand draft to JNU will be sent to the concerned University for refund after first semester.

- 5) In case the candidate is offered admission in accordance with his/her options for joining the University vis-à-vis his/her inter-se merit, but subsequently either does not join the concerned University or withdraw after joining during the first semester then in that event, the initial deposit of Rs. 5,000/- and Rs.2,500/- for General/OBC/EWS and SC/ST/PWD categories respectively, shall stand forfeited.
- 6) The initial security deposit of Rs.5000/-, (Rs.2,500/- in the case of SC/ST, PWD category candidates) will be refunded in full to those of the candidates who are not offered admission to any of the participating university.
- 7) **Candidates may note that request for transfer from one university to another will not be entertained under any circumstances. Therefore, candidates are advised not to make any request in this regard.**
- 8) Only those candidates who will be asked to exercise their option, the letter of these candidates will be available on JNU website (www.jnu.ac.in)) although intimation to this effect is also sent to the candidates on their e-mail account. However, the candidates are advised to find out through their own sources whether their names appear in the list and thereby make arrangement for sending their final option together with initial security deposit by the stipulated date. **The University will not issue any paper intimation to the candidates. Candidates are advised to regularly check JNU website for updates.**
- 9) **PLEASE NOTE THAT AFTER THE FIRST MERIT LIST, THE SECOND LIST MAY BE RELEASED ONLY BASED ON VACANCIES. THE DECISION TO RELEASE THE SECOND LIST RESTS SOLELY WITH JNU.**

IX. TIME -TABLE FOR ADMISSION

1.	Start of Online Application Process	-	15.03.2019
2.	Closing of Online Application Process	-	15.04.2019
3.	Last date of successful transaction of fee Through Credit/Debit Card/Net-Banking up to 11.50 pm up to bank hours of 16 April, 2019	-	16.04.2019
4.	Correction in particulars of Application Form on website only	-	17.04.2019 to 19.04.2019
5.	Downloading of Admit Card from NTA website	-	22.04.2019
6.	Date of Entrance Examination	-	30 th May, 2019 (9:30 am – 12:30 pm)
7.	Display of recorded responses and Answer Keys for inviting challenges on NTAs Website	-	To be announce later by NTA
8.	Results of Entrance Examination		
	(i) Merit list of candidates to exercise their option for Universities		2 nd week of June, 2019
	(ii). Final result of allotted Universities		1st week of July, 2019
9.	For admission/result queries candidate may visit our website www.jnu.ac.in		

Although the University will inform the candidates falling under consideration zone about their merit in CEEB on their e-mail account, it is the responsibility of the candidate to see the result on University website. The letter of these candidates will also be available on JNU website (www.jnu.ac.in). **The University will not issue any paper intimation to the candidates. Candidates are advised to regularly check JNU website for updates.**

X. HOSTEL FACILITIES

The outstation candidates admitted to the program of study of the participating Universities will be considered for hostel accommodation as per rules of the concerned University subject to availability of hostel accommodation. Students may please note that grant of admission in a University would not ensure automatic allotment of hostel accommodation and that the same will be offered subject to its availability.

XI. CERTIFICATES AND OTHER DOCUMENTS REQUIRED AT THE TIME ADMISSION

- (a) Two self-attested copies of the Matriculation, Higher Secondary Pre-University of Indian School Certificate or Senior School Certificate (10+2) or an equivalent examination certificate, showing the age/date of birth of the candidate;
- (b) A Character Certificate from the Head of the Institution last attended;
- (c) Two self-attested copies of the statement of marks obtained by the candidate in Senior School, Bachelor's Degree/ Master's Degree examination etc; or their equivalent examination;
- (d) Two self-attested copies of the Bachelor's Degree and/Master's Degree;
- (e) SC/ST/OBC/EWS Certificate, if belonging to SC/ST/OBC/EWS category
- (f) A Medical Certificate for PWD Candidates certifying nature & percentage of disability issued by the competent medical authority.
- (g) Migration Certificate (in original) from the Head of the Institution/University last attended.

Important: The candidates are also required to produce all originals of the above certificates/documents for verification at the time of registration/admission. In the absence of any of the original certificates/documents, registration/ admission shall not be allowed.

XII. INSTRUCTIONS FOR COMPLETING THE APPLICATION FORM

- 1. Name of the Candidate:** Please note that your name, your parent's/guardian's name, and your date of birth should exactly be the same as given in your 10th class or first Board/Pre-University examination certificate. Any deviation, whenever discovered, may lead to cancellation of your candidature.
- 2. Entrance Examination Centre:** A list of cities* where entrance examination is to be held is given below. **No change will be permitted and no correspondence in this context will be entertained.** In case it is not possible to allot the Centre of your choice, the University reserves the right to allot you alternative centre.

Sl. No.	State	Name of Examination Centre
1	ANDHRA PRADESH	Chittoor
2		Kakinada
3		Nellore
4		Rajahmundry
5		Tirupati
6		Vijayawada
7		Visakhapatnam
8	ARUNACHAL PRADESH	Naharlagun
9	ASSAM	Guwahati
10		Silchar
11	BIHAR	Darbhanga
12		Aurangabad
13		Patna
14		Purnia (Purnea)
15		Gaya
16		Bhagalpur
17	Chandigarh (UT)	Chandigarh
18	CHHATISGARH	Bilaspur
19		Raipur
20	DELHI	Delhi
21	GUJARAT	Ahmedabad
22		Gandhinagar
23		Anand
Sl. No.	State	Name of Examination Centre
24		Rajkot

25		Surat
26		Vadodara
27		Mehsana
28	HARYANA	Ambala
29		Hissar
30		Kurukshetra
31		Panipat
32		Gurugram
33		Karnal
34		Faridabad
35	HIMACHAL PRADESH	Shimla
36		Hamirpur
37	JAMMU & KASHMIR	Jammu
38	JHARKHAND	Dhanbad
39		Jamshedpur
40		Ranchi
41	KARNATAKA	Bangalore
42		Belgaum
43		Dharwad
44		Gulbarga
45		Hubli
46		Mangaluru
47		Manipal
48		Mysuru
49	KERALA	Alappuzha
50		Thiruvananthapuram
51		Ernakulam/Kochi
52		Kannur
53		Kottayam
54		Kollam
55		Kozhikode
56	MADHYA PRADESH	Gwalior
57		Sagar
58		Jabalpur
59		Bhopal
60		Indore
61		Satna
62		Ujjain
63	MAHARASHTRA	Mumbai
64		Nagpur
65		Pune
66		Aurangabad (Maharashtra)
67		Kolhapur
68		Nanded
69		Nasik
70		Navi Mumbai

71		Amravati
72		Jalgaon
73		Thane
74	MANIPUR	Imphal
75	MEGHALAYA	Shillong
76	MIZORAM	Aizwal
77	NAGALAND	Dimapur
78	ORISSA	Bhubaneshwar
79		Sambalpur
80		Balasore
81		Cuttack
82		Rourkela
83	Puducherry	Puducherry
84	PUNJAB	Amritsar
85		Bhatinda
86		Ludhiana
87		Jalandhar
88		Mohali
89		Patiala
90		Sangrur
91	RAJASTHAN	Jaipur
92		Jodhpur
93		Udaipur
94		Ajmer
95		Alwar
96		Bikaner
97		Kota
98		Sikar
99	SIKKIM	Gangtok
100	TAMIL NADU	Chennai
101		Coimbatore
102		Madurai
103		Nagarcoil
104		Tiruchirappalli
105	TELANGANA	Hyderabad
106		Warangal
107	TRIPURA	Agartala
108	UTTAR PRADESH	Lucknow
109		Varanasi
110		Allahabad
111		Bareilly
112		Ghaziabad
113		Gorakhpur
114		Noida
115		Agra
116		Aligarh

117		Kanpur
118		Meerut
119	UTTARAKHAND	Dehradun
120		Roorkee
121		Haldwani
122	WEST BENGAL	Kolkata
123		Siliguri
124		Kalyani
125		Hooghly
126		Asansol
127	UNION TERRITORIES	Goa (Panaji/Madgaon)

** Subject to sufficient number of candidates available.*

Note:

1. The University reserves the right to change/cancel any Centre of Examination within India/abroad without assigning any reason.
5. **Entrance Examination Fee:** The entrance examination fee is Rs. 1000/- for general category candidates including OBC & EWS candidates; and Rs. 500/- for the candidates belonging to SC/ST and Person with Disability categories. The entrance examination fee for Foreign Nationals is US\$ 40.00 or Rs. 2880/-.

Important Notes:

1. If any information furnished by the candidate in the application form is found to be false, his/her admission, if granted on the basis of such information will be cancelled, ipso facto.
2. The candidate must fulfil the eligibility requirements as detailed in the Prospectus. The candidate should, appear in the entrance examination only if the eligibility requirements for M.Sc. Biotechnology programme is fulfilled. Despite this caution, in case a candidate does not meet the minimum eligibility criteria and still appears in the entrance examination, then the candidate will be doing so at their own risk and cost, and if at any stage, it is found that the candidate does not fulfil the minimum eligibility requirements, the admission, if granted, shall be cancelled ipso facto.
3. Any dispute with regard to any matter relating to admission shall be subject to the jurisdiction of Delhi Courts only.
