

POST GRADUATE DIPLOMA IN PROFESSIONAL BIOTECHNOLOGY (PGDBT)

Incharge- Dr. TriptaVerma, Department of Biotechnology

The **Department of Biotechnology** was established in 1996 to introduce students to innovative concepts in Biological sciences. **Post Graduate Diploma in Professional Biotechnology (PGDBT)** course is affiliated with M. J. P. Rohilkhand University, Bareilly. Since we are striding through an era of Biotechnology, we intend to produce highly trained and skilled professionals with the potential to serve various industries, organisations and institutions. The syllabus of PGDBT is designed in such a way that the students are exposed more to practical exercises rather than theoretical knowledge only. Besides highly qualified and experienced faculty, the department is strengthened by inviting specialised experts for practical training, guest lecturers of subject specialists, and organising seminars, presentations and visits to industries and reputed institutions.

INFRASTRUCTURE:

Laboratory:

The department has sophisticated and well-equipped independent labs with all essential equipment like thermal cycler, Spectrophotometer, ELISA reader, Laminar air flow chamber, Inverted microscope and binocular microscopes, Refrigerated centrifuge, Incubated rotary Shaker, BOD incubator, Colorimeter, Deep freezer (-20°C), Hot air oven, Digital pH meter, UV Trans-illuminator, Electrophoresis units, Microcentrifuge, Sensitive Balances, Water bath, Autoclave, Double Distillation units.

Biotechnology Lab is well-furnished with audio-visual teaching units, a projector, a slide projector, and a computer for class lectures and seminar presentations.

Lecture hall:

There is an independent lecture hall for the theory classes.

Library:

Department of Biotechnology is provided with a separate library room for study, equipped with many textbooks, standard reference books, and lab manuals of Indian and foreign authors.

ELIGIBILITY:

Students seeking admission to PGDBT must be undergraduates in Bio-Group. The minimum qualification for this course is B.Sc. in Biotechnology / Zoology / Botany / Chemistry / Environment Science / Agriculture with at least 45% marks. The criteria of regular attendance may be relaxed for school teachers or candidates already employed elsewhere.

NUMBER OF SEATS: 40 + 4 (EWS Category)

Reservation as per University rules.

FEE STRUCTURE:

The total fee for the complete annual course is Rs. 10,535/-.

The University examination fee shall be payable extra as applicable.

ADMISSION PROCEDURE:

Admission will be based on interview cum merit.

The candidate has to get offline registration at the Department of Biotechnology and online registration at M.J.P.R.U. Website.

COURSE STRUCTURE:

Post Graduate Diploma in Professional Biotechnology is **One-year job-oriented course**. The main features of this course are:

1. Each **THEORY** paper will be of **100** marks, and the **PRACTICAL** of **400** marks. The total marks will be **1000**. Passing marks are 40%.
2. The course focuses on the applied curriculum, practical knowledge of related experiments, acquaintance with equipment & techniques, and presentation skills.
3. **One-month training** at any research institute, industry, hospital or pathology centre is essential to boost the technical and professional skills which eventually facilitate placements.
4. Invited lectures from experts, group discussions, quizzes and educational visits to institutes and industries further strengthen it.

JOB AVENUES:

PGDBT students are imparted hands-on training and get technical expertise which enables them fit for several career opportunities in the fields of biotechnology and life sciences. The students are fairly recruited in various organisations/industries of **Bio-fertilizers, Bio-pesticides, Bioremediation, Molecular farming, Pharmaceuticals, Vaccines, Drug designing, Food and Dairy, Bakery, Beverages, Microbial quality control, Paper and pulp, Tissue-culture and micropropagation, Floriculture and mushroom production etc.**

Besides pursuing higher studies in Biotechnology and related disciplines, several alumni are Biotechnologists in esteemed research Institutes, teachers in many institutions, and several working in industries and holding respectable positions in India and abroad. Some alumni of Biotechnology have established **entrepreneurs** and set up their wet labs and **start-ups** in biotechnological products, bioinformatics and drug designing *etc.*

SYLLABUS:

The curriculum of PGDBT includes the following **six** papers: -

PAPER –I. GENE BIOTECHNOLOGY AND MOLECULAR TECHNIQUES

1. Prokaryotic genes and their replication.
2. Gene recombination in prokaryotes with special reference to transposons.
3. Expression of genes in prokaryotes : Operon concept (lac, his, ara, trp, leu).
4. Oncogenes and Interferons : An elementary idea.
5. Gene isolation. RNA-DNA hybridization and use of restriction endonuclease.
6. Gene sequencing.
7. Marker genes, gene integration, GUS genes, Luciferase gene and gene amplification.
8. Gene transfer (direct, through microinjection & gun particle transfer).
9. Tools of genetic engineering : Vectors : Phagemids, Plasmids, Cosmids. Genetic probes.
10. Transgenic plants (heat shock gene transgenesis, stress resistant transgenesis for molecular farming, herbicide resistant transgenesis, insect resistant transgenesis, Bt toxin gene transgenesis, protease inhibitor transgenesis) : A basic idea.

PAPER - II. MICROBIAL BIOTECHNOLOGY

1. Microbiology : its basic introduction, brief idea of their utility as biotechnological tool.
2. Methods for microbial studies and their growth maintenance.
 - (a) Isolation and sterilization methods.
 - (b) Microscopy : SEM, TEM and Optical
 - (c) Pure culture methods.
3. Microbes in extreme environment :
 - (a) Nitrifying microbes, nitrogen fixing and denitrifying microbes.
 - (b) Microbial biodeterioration of agricultural produce, biodegradation and Pest control.
4. Microbial Metabolism : Growth, Culture, Nutrients, Physiology and multiplication.
5. Environmental microbiology : Microbes of soil, air and water. Mass culture and axenic cultures. Applications in solving environmental hazards and pollution. Microbes as pollution indicator.

PAPER - III. BIOTECHNOLOGY : INSTRUMENTATION

1. Various techniques and instruments used in Biotechnology : their principle of working and applications. Practical demonstration of major equipments.
 - (a) Centrifugation and various types of centrifuge.
 - (b) Electrophoresis, their types and uses.
 - (c) Blotting techniques and DNA fingerprinting.
 - (d) Chromatography : Absorption, Ion exchange, Thin layer and Paper.
 - (e) Spectrophotometry and Colorimetry.
 - (f) Gieger Muller counter and Scintillation Counter.
 - (g) Autoradiography
 - (h) Polarimetry (i) Electron Microscopy (ii) X-Ray Crystallography
 - (i) Atomic absorption spectrometry

PAPER - IV. FOOD AND INDUSTRIAL MICROBIOLOGY

1. Fermentation, various types of fermentation, their biotechnological produce, their process, fermenters and industrial applications of fermentation.
2. Micro-organisms in industries:
 - (a) In pharmaceutical industries: Antibiotics, Steroids, Vitamins & Vaccines.
 - (b) For organic acid production: Acetic acid, Citric acid, Lactic acid, Amino acids.
 - (c) For enzyme production
 - (d) In Brewing industries: Distilled spirit, Undistilled spirit, Beer, Wine and their process.
 - (e) Bio leaching: Facts and figures.
 - (f) Bio fertilizers and their production.
 - (g) Paper Production.
3. Food microbiology:
 - (a) Various microbes used in food industries
 - (b) Fermented food products
 - (c) Single cell proteins
 - (d) Spirulina food
 - (e) Milk products
4. Micro organisms in food spoilage and food preservations.
5. Mycotoxins.

PAPER- V. ANIMAL BIOTECHNOLOGY & IMMUNOLOGY

1. Primary animal culture: Anchorage & non anchorage dependent cell lines.
2. Secondary culture. Transformed animal cells. Established/continuous cell lines.
3. Animal cell culture, its applications for studying gene expression.
4. Cultivation of animal tissue (Slide/cover slip, Flask and Test tube cultures).
5. Organ culture (embryonic organ culture on plasma dots, agar, fluid media).
6. Embryo culture technique: Sugar ovulation, IVF, Embryo culture in dairy animals.
7. Embryo transplantation in Farm animals.
8. Immune system & immunity. Antigen-antibody (structure & interaction).
9. Immunity to contagious diseases. Immunoassay through monoclonal antibodies.
10. Recombinant vaccine production. Rinder pest and anti Rabies vaccines.
11. Attenuated vaccines: Single or combined vaccines.
12. Secondary metabolites (growth hormones, Insulin, t-plasminogen activator & Factor VIII).

PAPER - VI. TISSUE CULTURE: THEORY AND PRACTICE

1. Tissue culture: An elementary idea of instruments and terminologies.
2. Laboratory organization, aseptic manipulation and need of a tissue culture lab.
3. Culture media, their types, configurations and necessity of its ingredients.
4. *In vitro* pollination, *in vitro* fertilization and *in vitro* culture.
5. Isolation of protoplasts, its viability test and regeneration.
6. Micro propagation and its applications with special reference to sugarcane crop.
7. Cryopreservation of plants: Frozen vegetables and mushrooms *etc.*
8. Applications of Tissue Culture for vegetables, timber yielding plants, horticulture and in the production of disease - free and stress - free plants.

CONTACT DETAILS

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