University of Mumbai

DEPARTMENT OF BIOPHYSICS

(EXCELLENCE IN TEACHING, TRAINING , RESEARCH & INNOVATION)

Opening
doors
for
brilliant
career

PROSPECTUS
(2018-19)

VIDYANGARI, SANTACRUZ (EAST), KALINA, MUMBAI 400098
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Sincerity, hardwork and dedication are keys of our success

FROM THE HEAD DESK

University of Mumbai is one of the Institutes in India to establish department of Biophysics (2001-2002) as an independent discipline and to have a department dedicated to study biology using tools and approaches of Physics and Physical Chemistry. The mission of the department is to promote and execute the highest quality of research, training and education. Department offers two year M.Sc. (Biophysics, by paper) post graduate course with choice based credit system and doctorate program. The two year post graduate training is structure in such a way as to expose the students to the frontier areas of biophysics, special emphasis being on laboratory work. The PhD program consist of course work and extensive research training with outstanding publications. The faculty members including adjunct professors, visiting professors (IIT, TIFR, UM DAE CEBS, and Medical Colleges etc.) play leading roles in the research and teaching activities. The members have expertise in specialized areas of biophysics such as Molecular Biophysics, Radiation Biophysics, physiological biophysics, nanobiophysics, biochemistry, structural biology, computational biophysics etc. The department has established uniqueness in the campus of University of Mumbai.

Department is enable to create and strengthen high quality research and training laboratory and library due to financial support from various Government funding agencies (DAE BRNS, DST, UGC, ICMR) and University of Mumbai. Research & training laboratories are well equipped with sophisticated equipment's such as Fluorescence spectrophotometer, Fluorescence Microscope, Fourier Transform Infrared Spectrometer (FT-IR protein probe), Surface Plasmon Resonance Analyzer, Raman Spectrophotometer, 2D gel with image analyzer, high speed refrigerated centrifuge, automatic protein purification unit etc.

In the last ten-twelve years, department has successfully organized several workshops, International and national conferences / seminars, Invited lectures on specialized areas of biophysics. Several past students of the department are perusing research in reputed national and international research laboratories in India and abroad. In coming years, Department is planning to expand research laboratory with mammalian cell culture facility and establish research linkage with International research laboratories, Industries and Institutes.

I am very much confident that the students of University department of biophysics with their wide academic exposure will leave a mark of their service, wherever they go, by exhibiting their sound academic knowledge, unimpeachable character, sense of discipline and commitment.

Dr. P M Dongre

Prof & Head, Department of Biophysics

The Department:

The Department of Biophysics has been established by the University of Mumbai at Vidyanagari Campus in 2001-2002. The Department of Biophysics provides training to outstanding students with interest of offering M. Sc. (Biophysics) and Ph.D. (Biophysics) courses.

The sole aim of the department is a making a high class of globally recognized "**Centre of Excellence**" in the field of Interdisciplinary areas of Science education training and research in the campus of University of Mumbai.

The students are admitted to M.Sc. programme on the basis merit at B.Sc. level i.e B.Sc/ B.Sc (Hons) majoring in Biophysics/ Physics/ Chemistry/Biochemistry/ Microbiology/ Biotechnology/ Forensic Science/ Bioinformatics/ any branch of biology with chemistry or physics/ B.Tech (Biotechnology/ Bioinformatics). A Candidate must have secured minimum 50% marks at B.Sc. Examination in the major subject for open candidates. For reserved candidates, University rules and regulation apply.

The quantitative area covered under this course such as Molecular and Cellular Biophysics, Radiation and Medical Biophysics, Biophysical Techniques,, Bioinformatics and Molecular Modeling, Biomolecular Spectroscopy and Crystallography, rDNA technology and protein engineering, Environmental Biophysics, Nanobiophysics & Nanomedicine etc. One of the important features of the M.Sc training programme is that major emphasis is given to hands on practical training to the students. Adjunct faculties, Scientist and experts from other Research Institutes and University Departments participate in the teaching program. Along with this training the outstanding Scientists, Professors from other Institutes and University visit the Department to hold seminars on specialized areas of Biophysics. As a result, the students get exposed to emerging areas of Science disciplines which helps in developing better understanding of the subject and widening the horizons in terms of information and knowledge. The teaching and research laboratories in the department are well equipped with all necessary equipments.

The Department has its own Library. Special efforts are taken to update the collections with latest Textbook and Scientific Journals. The students of the department are provided with internet facility to access relevant research of the subject and also the components in other disciplines. Every student is required to complete a small research project during the second year of the program. The special efforts are taken by the department for the students who appear for National Test for junior research fellowship and lecturership and test conducted by UGC/CSIR and other National Institutes.

Along with the hectic teaching program the department also holds Social, Cultural and Personality development programs, which again help the fulfillment of the student's progress.

The research in the department of Biophysics encompasses in frontier areas of Biophysical Sciences *viz*. Molecular and Cellular Biophysics, Membrane Biophysics, Radiation Biophysics,

Nanobiophysics, Bioinformatics. The funds for the research are being arranged from various donor agencies like UGC, CSIR, DST, DBT, DRDO,DAE and NGO's etc.

COURSE STRUCTURE

M.Sc. (Biophysics) by paper and **Ph. D**.

Revised syllabus of M.Sc. Biophysics (Choice Based Credit system)

Semester I

Paper code	Paper nomenclature	Lectures	Credit	Practical/Laboratory course	Hrs	Credit	Total Credit
BP-CCT 101	General physico-chemical Principles	60	04	Lab course (**BP-LBC)** 101	60	02	06
BP-CCT 102	Biomathematics & Biostatistics	60	04	Lab course (**BP-LBC)** 102	60	02	06
BP-CCT 103	Cellular Biophysics	60	04	Lab course (**BP-LBC)** 103	60	02	06
BP-CCT 104	Methods in Biophysics	60	04	Lab course (**BP-LBC)** 104	60	02	06
	Total						**24**
	Semester II						
BP-CCT 201	Membrane Biophysics & Ion channels	60	04	Lab course (**BP-LBC)** 201	60	02	06
BP-CCT 202	Molecular Biophysics	60	04	Lab course (**BP-LBC)** 202	60	02	06
BP-CCT 203	Biochemistry	60	04	Lab course (**BP-LBC)** 203	60	02	06
BP-CCT 204	Recombinant DNA Technology & Protein Engineering	60	04	Lab course (**BP-LBC)**	60	02	06

				204			
	Total						**24**

Semester III							
Paper code	Paper nomenclature	Lectures	Credit	Practical Paper No & Code	Hrs	Credit	Total Credit
PB-CCT 301	Physiological Biophysics	60	04	Lab course I (BP-LBC 301)	60	02	06
BP-CCT 302	Bio crystallography & Magnetic Resonance Techniques	60	04	Lab course II (BP-LBC 302)	60	02	06
BP-CCT 303	Radiation Biophysics	60	04	Lab Course III (BP-LBC 303)	60	02	06
PB -CCT 304	Advanced in Biophysical Techniques	60	04	Lab Course IV Research Project /Review literature	60	02	06
	Total						**24**
	Semester IV						
BP-CCT 401	Medical Biophysics	60	04	Lab Course I (BP-LBC 401)	60	02	06
BP-CCT 402	Environmental Biophysics	60	04	Lab Course II BP-LBC 402	60	02	06
BP-CCT 403	Nanobiophysics and nanomedicine	60	04	Lab Course III (BP-LBC 403)	60	02	06
BP-CCT 404	Elements of Bioinformatics, molecular modelling and drug design	60	04	Lab Course IV (BP-LBC 404) Research Project	60	02	06
					120		24
	Total						24

	Grand Total (Sem III & IV)						**48**

Total credits (M.Sc). = 96

Evaluation: The students will be evaluated internally and externally. The internal evaluation is done by teachers and external evaluation done by the committee appointed by the University norms. Standard passing and scale as per the university norms**.** The duration of the course is two years.

Ph.D. Programme:

The Ph.D. Degree (in Biophysics): involves submission of Dissertation / Thesis to the University based on the research conducted under the supervision of a faculty members (who recognized Teacher of the University for guiding students for Ph. D degree) working at the department of Biophysics. Students with Masters Degree (M. Sc) in Sciences (as per the University circular No. 441 of 2005 & VCD's) are entitled to seek admission for Ph.D. programme of Biophysics

Selection of the Candidates:

Selection of the candidate is on the purely merit basis.

Issuance of forms:

Copies of the prescribed application forms for admission can be obtained from Office of the Head, Department of Biophysics, University of Mumbai, Vidynagari, Santacruz (E), Kalina, Mumbai 400098 by paying cash Rs.100/ or DD in favor of **The Finance and Account Officer**" University of Mumbai.

Submission of forms:

The duly completed forms should be submitted to The Head, Department of Biophysics, University of Mumbai, Vidyanagari, Santa Cruz (E), Kalina 400098.

Location:

The Biophysics Department is located at Vidyanagari Campus of University of Mumbai. The Vidyanagari Campus is accessible both by Central Railway (Kurla) and Westrern Railway (Santacruz). BEST routes 37, 306, 212, 313, 318, 374, 449, 312, 181 via Vidyanagari.

Laboratory facility:

1. Fluorescence Spectrophotometer
2. Raman Spectrophotometer
3. FTIR Spectrophotometer
4. Surface Plasmon Analyzer
5. Fluorescence Microscope with camera & image analysis software
6. 2-D Gel Electrophoresis with molecular imager
7. Refrigerator Centrifuge

8. UV Visible Spectrophotometers
9. Rotary Vacuum Evaporator
10. Precision balances
11. GM Counter & Radiation monitor
12. PCR & Nanophotometer
13. Data Acquisition System
14. Dynamic light scattering & zeta potential
15. Protein purification system
16. Gamma irradiation facility (in Process)
17. Cell Culture Laboratory (in Process)

Library:

The Department has its own library with well equipped books, Journals and periodicals. The Departmental library has more than 250 text books including recent and applied text books. The Department is taking special efforts to update latest Textbook and Scientific Journals. The students can avail Jawaharlal Nehru Library facility at the Vidyanagari Campus.

Financial Assistance:

Scholarships:

- National Merit Scholarship
- GOI merit scholarship
- Merit scholarship is also available of the University of Mumbai.

Study Tour:

The Department organizes study Tour for the students every year. The student should visit to the National Research laboratories and R & D Industries laboratories in India.

General Instructions to applications for filling up the application form.

Admissions to the students belonging to SC / ST/ DT/ NT/ OBC category will the sought as per the rules of Govt. of Maharashtra. Application must be accompanied by caste certificates duly certified by competent authority. In case of OBC students the “Creamy Layer” Certificate should be issued by the competent authority during the current financial year along with the application. Applicants who are graduates from Universities other than University of Mumbai are required to obtain a certificate of eligibility (Provisional) from the University of Mumbai.

Application must be accompanied by attested copy of the statement of the marks obtained by the applicants at I, II and III year of B.Sc. examination along with their original which will retain in the office & will be returned to the concerned students on specified dates.

Instruction to the candidates:

Candidates will have to enclose the following certificates:

- Attested copies of the marks memo of I, II & III year B.Sc. examination passed by them.
- Applicants belonging to the reserve categories (SC/ST/SC) converted to Buddhism, DT/SPL backward class, and NT-1 will have to bring attested photo copy of the caste certificate issued by the competent authority.
- Candidates belonging to the OBC categories will have to bring attested photo copy of the Creamy Layer certificate issued in the current financial year by the competent authority. Applicants belonging to categories mentioned above without the Creamy Layer certificate will not be entertained.

Special Instructions to the candidates whose names have in the list of admission:

- Admission will not be given unless the original T Y B.Sc. Mark sheet is deposited with the office.
- The student who wants to cancel their admission could collect their original mark sheet only after producing documentary evidence from the authorities of College/ Institute where the students have secured admission. Such students will have to surrender their seat by giving a written application to the Head department of Biophysics stating the reason for the cancellation of admission.
- Students whose original markssheet are deposited with the office should claim the same on specified date.

FEES STRUCTURE:

The total numbers of seats are 20, out of which seats are allotted to reserve categories as per the rules and regulation of Govt. of Maharashtra and 3% seats are reserved for the students from other universities other than Mumbai University.

Revised Fee structure for M.Sc courses (wef from the academic year 2009-2010)

Sr. No	Particulars	Amount Rs.
1	Tuition fee	15,000/-
2	Forms and Prospectus	100/-
3	Other fees/ Extracurricular activities	250/-
4	University exam fee	600/-

5	Mark sheet	50/-
6	Laboratory fee	15,000/-
7	Library	1000/-
8	Gymkhana	200/-
9	Admission processing fee	200/-
10	Vice Chancellors fund	20/-
11	Magazine	100/-
12	Identity card	50/-
13	Group Insurance	40/-
14	Student welfare	50/-
15	University sports and Cultural activities	30/-
16	Development fee	500/-
17	Utility	250/-
18	Computer/Internet	500/-
19	e-suvidha	50/-
20	e-charges	20/-
21	Disaster relief fund	10/-
	Total	**34,020/-**

Note: some fee heads may changes time to time

Document verification : 400/- wherever applicable

Refundable deposit

Caution Money : 150/-

Library Deposit : 250/-

Laboratory deposit : 400/-

Project fee : 2000/- (wherever applicable)

Registration fee for M.Sc. Part I only : 1000/-

Convocation fee only for MSc. Part II : 250/-

NB. Foreign students will have to pay five times of prescribed fees. The fees collected in different heads be spend only for specified purpose for which it has been collected.

Fees are payable by cash in the Allahabad Bank, Kalina Branch, Wadia High School, Ground Floor, Opp. University Campus.

- Tuitions fees once paid are normally not refunded. However, tuition fees will be refunded if the candidates do not attend any theory/practical/seminar class. Application for refund of fees should be addressed to the Registrar, University of Mumbai in duplicate.
- No transference Certificate will be issued to the students who leave the Department, unless they clear all the dues.

Academic activities:

Invited Lectures/ Seminar:

The Department of Biophysics regularly organizes invited Lectures/ Seminar. The seminar delivered by outstanding Scientist, Professors from National Research Laboratory and Indian Universities**.**

Research activities/ highlights:

Thrust areas: Nanobiophysics, nanomedicine, proteomics , radiation biophysics

University Department of Biophysics is making small but concrete efforts to align its focus on research and development. Students and faculty conduct research projects in thrust areas of applied and basics sciences. The department has ongoing academic and research collaborations with reputed research laboratories and Institutes in order to keep pace with expanding frontiers of knowledge and global developments.

Nanomaterials are at the leading edge of the rapidly developing field of nanotechnology. Their unique size-dependent properties make these materials superior and indispensable in many areas of human activity. Designing non-toxic nanomaterials requires it is certainly to understand that how these nanomaterials interact with biological systems like bio-macromolecules (protein, enzyme, lipid etc), cells , cell membranes etc. So the question becomes…how do nanomaterials transform / interact once they come into contact with biomolecules? This question has become increasingly important, especially as nanomaterials are developed for the biotechnology and nanomedicine fields. Therefore, the department is mainly focusing on understanding the mechanisms of interaction of nanoparticles with biological systems (protein/enzyme/membrane/cells) using biophysical approaches. We employ various biophysical tools such as fluorescence spectrophotometer, Raman spectrophotometer, FT-IR, Fluorescence Microscopy, UV Visible spectrophotometer, Fluorescence Microscope, Dynamic Light Scattering, Atomic Force Microscope (Bio AFM), Surface Plasmon Resonance Analyzer, single and 2-D gel electrophoresis etc.

The output of the research projects conducted since 2009-10 by the department has been reflected in many national and international peer review index research journals with their citation numbers.

Research collaboration:

Dr Balabhai Nanaati Hospital, Mumbai

Life force Trust , Mumbai

Ashwamegh Biotech, Ahmadnagar

UM DAE Centre for Excellence in Basic Sciences

University departments

DEPARTEMENTAL – INDUSTRIAL EXCHANGE RESEARCH PROGRAM (DIERP):

The Department of Biophysics is endeavoring establish to DIERP with different Industrial Sectors those who actively engaged in research with specialized areas such as Bioinformatics, Molecular Biology, Nanobiology / Nanotechnology, Biomedical engineering, structure based drug design etc. This will helps to the students for immediate placement. Department is finding the possibilities to get some incentives in DIERP program.

SPORTS, CULTUTRE AND RECREATION:

With a view to develop all-round personality of the students the Department gives an equal importance to co-curricular and extracurricular activities. It is the constant endeavor of the department to see that the students grow intellectually as well as physically.

We take every effort to encourage our students to participate in various activities such as social, cultural and sports. The students participate in various sports, cultural and scientific activities conducted by the university and other Institutes. The department organizes cultural and social activities. The department encourages to the students for participation in extra and co-curricular activities.

DICIPLINES AND CONDUCT:

Student's /Parents/ Guardians are specially requested to note that below mentioned are the discipline rules and the code of conduct for the students of the Biophysics Departments.

- It is imperative that the students attend the department from the day of opening to the last day of each term during the academic year.
- Student must be absolutely regular in attendance for theory and practical lessons. In case the attendance failing short of 80% for each, theory and practical term will not be granted. Incase of any genuine reason, the student/ guardian must inform in advance and in writing to the authorities to the department about the reason for absence. However this does not entitle him/her for any relaxation in the required attendance prescribed by the University.
- Students must attend all the tutorials, class tests, mid term and any other departmental examination and assignments.

- Students and Parents should specially note that if the students fails to complete the term work regularly and to entire satisfaction of the Head of the Department, he/she will not be granted the term and will not be allowed to appear for the University examination.
- Any reported observed, objectionable conduct within the premises of the department will make him/her liable for strict disciplinary action.
- Students should not participate in any political and anti social activities.
- Students should help in maintaining the building and the campus of the department clean and tidy.
- Students must wear apron during the practical hours.

DEVELOPMENT PLANS: The future plans of upgrading the department.

a) Installation of gamma irradiator (in process)

b) Development of Mammalian cell culture laboratory

c) Installation Isothermal calorimetery

d) Installation of Nanotechnology based equipments.

e) To offer specialization in the Subject during second year.

Finally, all the efforts of the department as mentioned above are directed towards providing need based and competence based education with the development of scientific Temperament the students as per guideline provided by the University of Mumbai and UGC. Efforts are made to impart value based training with ethical, innovative and social aspects to make them necessary competence and to shoulder responsibility of the Nations and society.

To harness the knowledge of Science and

Technology for the welfare of the Society