

## **M. Sc. in Microbiology & Microbial Technology**

(A Self financing course)

*University of Kalyani*

### **The University**

The University of Kalyani is situated at Kalyani Township in the District of Nadia, West Bengal. The township is located at a distance of 50 km away from Kolkata with the National Highway on the one side and the river Ganga on the other. Kalyani is gradually emerging as a momentous centre of higher education in the State. In and around the Kalyani Township four Universities namely, Bidhan Chandra Krishi Viswavidyalaya, West Bengal University of Animal and Fisheries Science, Netaji Subhas Chandra Open University and West Bengal University of Technology have been set up besides the Kalyani University. The University was established in the year 1960 with a vast campus area of 325 acres in a rural and eco-friendly set up. With the passing of time, the Kalyani University established itself as a vibrant centre for intellectual pursuit and a centre for higher study. The academic expansion resulted in opening of new faculties namely, Engineering, Technology, Law, and Music and Fine Arts and some new teaching departments, research and extension wings. The University is playing a significant role in expanding the horizon of applied sciences, technical and professional education in the State. Presently, the University is offering advanced facilities for post-graduate education and research in 23 different subjects in science, engineering, technology, management, commerce, arts, fine arts and education.

### **Microbiology and its Prospects**

During the early part of the 20<sup>th</sup> Century, Microbiology developed somewhat independently of other biological disciplines. The pace of advancement of the discipline and its societal relevance enhanced impressively in the context of scope and relevance of the subject in the different fields of applied microbiology with the application of biotechnology and genetic engineering. However, the interdisciplinary approach of the subject is imperative in the present scenario. The University of Kalyani felt such importance and proposed to start the Microbiology course at post-graduate level from 2001. The cooperation of the teachers of the interacting Departments of the University has been ensured, so as to bring together all the relevant disciplines in a common platform to impart this multidisciplinary course.

The modern biological development is going on at a tremendous pace. Microbiology has taken a unique position in respect of basic and applied aspects of food and dairy products, environment, agriculture, various industries and medical and public health.

The course would help the aspirant graduates in getting a broad based knowledge about theoretical and applied aspects of different disciplines of microbiology in general and its frontier areas in

particular. It is aimed at offering high quality training and generating expertise in the frontier areas of microbial technology, and to provide appreciative atmosphere to the bright young talents. The course includes *inter-alia*, collaborative efforts with different institutes, industries, clinical laboratories and other agencies. Hence, the post-graduate course may open multi-channel opportunity of employment and entrepreneurship.

### **Post-Graduate Course in Microbiology & Microbial Technology**

The Post-Graduate course in Microbiology, recognized by UGC and Government of West Bengal, was offered for the first time in the academic session of 2001 -2003. Since 2004 the course has been renamed as Microbiology & Microbial Technology with updated syllabi.

Eminent teachers and researchers from the different Departments of the University of Kalyani, Calcutta University, University of Burdwan, Bose Institute, National Institute of Cholera and Enteric Diseases, School of Tropical Medicine, Indian Institute of Chemical Biology, Central Inland Fisheries Research Institute, National Institute of Technical Teachers' Training Institute, and Kalyani Govt. Engineering College acted as resource persons and delivered class lectures.

The infrastructural facilities of the Microbiology classroom and laboratories have been developed with modern instruments, audio-visual system and computer facilities. The library has been enriched with current text and reference books. Internet facilities are available to the students at the Internet Centre of the University and in the Department itself.

The students are sent for their scheduled summer training of 4 -6 weeks duration at the Laboratories of different Institutes and Universities like: (1) Indian Institute of Technology, Khargapur, (2) Biochemistry Unit, Indian Statistical Institute, Kolkata (3) Department of Microbiology, Bose Institute, Kolkata, (4) Department of Biophysics, Saha Institute of Nuclear Physics, Kolkata, (5) Department of Biophysics, Molecular Biology and Genetics, Calcutta University, (6) National Institute of Cholera and Enteric Diseases, Kolkata, (7) School of Tropical Medicines, Kolkata, (8) Indian Institute of Chemical Biology, Kolkata, (9) Indian Institute for Cultivation of Science, Kolkata and are also sent for their project work at the following Industries: (1) Dey's Medical Stores (Manufacturing) Limited, Kolkata, (2) Albert David Limited, Kolkata, (3) United Breweries Limited, Kalyani, (4) Kalyani Yeast, Kalyani, (5) Fresenius Kabi Oncology Ltd, Kalyani, (6) Jupiter Allen Pvt. Ltd., Kolkata, (7) Mother Dairy Calcutta, Dankuni, (8) East India Pharmaceutical Pvt. Ltd. Kolkata, (9) EMCEE Pharmaceuticals, Kalyani, (10) Virgin Beverages, Kolkata, (11) Bengal Beverage Pvt. Ltd. (Coca Cola), Dankuni, (12) Haringhata Dairy Farm, Nadia.

### **Microbiology Department**

The Department of Microbiology offers Post Graduate degree in M. Sc. in Microbiology & Microbial Technology. The Department has two permanent faculty positions and a number of eminent resource persons. The Department has shown its mark in the teaching in Microbiology since 2001. Some

Researchers from different National Institutes and Universities/ foreign University are conducting their research work in the field of Environmental Microbiology and Molecular biology in collaboration with our resource persons. The Department has 10 candidates those who have already enrolled their name as Ph.D. student in this Department; 4 candidates are in queue for admission to Ph.D. course in new format, 7 candidates have been awarded with Ph.D. degree. The Department received financial support for purchase of equipment and extension of building work from different funding agencies. Since 2003 over 52 students passing out from the Department have qualified NET/GATE/SLET/NET(ICMR) and many of them are working for their Ph. D. degree in different Universities and Research Institutes of National level in India and abroad. Rests of the successful candidates have been placed in different jobs in Colleges and Industries.

The Department has already developed its infrastructure with some sophisticated equipments like, fermentor, *UV- vis* spectrophotometer, PCR thermocycler, RT-PCR, ELISA Reader, BOD chamber, cold centrifuge, Gel-documentation, Phase contrast microscope and other essential equipments required for conducting research and practical classes. The research and PG students have access to other facilities like Image analysis, Atomic absorption spectroscopy, High -performance liquid chromatography etc. from other interacting Departments of this University.

### **Interacting Departments**

Department of Biochemistry and Biophysics, Department of Botany, Department of Zoology, Department of Chemistry, Department of Statistics, Department of Environmental Sciences, Department of Computer Science, Department of Molecular Biology and Biotechnology, and International Centre for Ecological Engineering are extending their cooperation in respect of making available of their laboratory infrastructural facilities and by permitting their faculty members to act as resource persons whenever required.

### **Library and Computer Facilities**

In addition to a developed Central Library in the University, each Department has its own library for providing easier borrowing and reading facilities to the students. The Department of Microbiology is especially enriched with books and journals in the various fields of Microbiology. The Botany, Biochemistry & Biophysics and Molecular Biology & Biotechnology also have significant numbers of books and journals in the field of Microbiology. In keeping with the course contents, the students are provided with computer terminals in the Department and with central computer and network facilities of the University and Bioinformatics Centre of the University.

### **Duration of the Course**

The course comprises of 4 semesters in two academic years.

### **Student intake**

**16 students** (at least 1 each from Honours Graduates in Botany, Chemistry, Physiology, Zoology, Molecular Biology/ Biotechnology, and Biochemistry; and 8 from the Microbiology Honours Graduates; 2 from composite merit list). Reservation of seats for SC and ST & PC candidates will be followed as per Government rule.

If vacancy arises candidate from respective wait-listed subject merit list may be admitted in order of merit; in case of non-availability of eligible candidate from subject merit list candidate from the composite merit list may be admitted in order of merit.

### **Eligibility**

Honours graduates (10 + 2 + 3 system) with at least 50% marks in Microbiology/ Botany / Zoology/ Chemistry/ Physiology/ Biochemistry/ Molecular Biology and/or Biotechnology Honours from any recognized University or Institute. Honours graduates other than Chemistry/ Biochemistry shall have Chemistry as a general subject (at least 300 marks including theoretical and practical papers) in degree course.

The applicant who has appeared in the final examination of B. Sc (Honours) is eligible to sit for admission test but he/she has to submit the final mark sheet before the publication of the final list of selected candidates.

### **Admission Test**

All the eligible applicants will have to sit in an admission test. The medium of instructions and examination shall be in English. Admission test will be of 75 minutes with 100 full marks. The questions will be objective type (Basic level).

### **Admission**

Candidates will be admitted according to the separate merit list prepared for each subject from the weighted average of the marks (in percentage) obtained in the Honours subject of the B.Sc. examination (50%), in the admission test (40%) and in H.S or its equivalent examination (10%). If students from any of the above disciplines are not available, the seat(s) will be filled in accordance to the order of merit in the composite merit list prepared taking all the candidates of all the subjects as mentioned earlier.

## Fees

The tuition and other fees may be paid either by cash or through Demand Draft drawn from any Nationalized Bank in favour of the *University of Kalyani*, strictly payable at Kalyani.

*Note* : Students have to bear their own traveling and living expenses and Project/Training cost, if required, while visiting Institutes or Industries for Summer/Industrial training or project work.

Fees Structure	1 <sup>st</sup> Semester Fees in Rupees	2 <sup>nd</sup> Semester Fees in Rupees	3 <sup>rd</sup> Semester Fees in Rupees	4 <sup>th</sup> Semester Fees in Rupees
1. Tuition fees	20,000	20,000	20,000	20,000
2. Admission fees	500		500	
3. Registration fees *	75	-	-	-
4. Session fees	100	-	100	-
5. Development fees	100	-	100	-
6. Library Deposit	100	-	-	-
7. Identity Card fees	15	-	-	-
8. Immigration fees	30	-	-	-
9. Sports fees	50	-	-	-
10. Student Health Home fees	5		5	
<b>Total</b>	<b>20,975</b>	<b>20,000</b>	<b>20,705</b>	<b>20,000</b>
Examination fee (During examination form fill up)	400	400	400	400

\* Not applicable for candidates

## Preparatory leave for examination

In each semester at least 7-10 days may be allowed as preparatory leave before each examination. Theoretical and Practical examinations will be completed tentatively within 15 days.

## Attendance and Examination

The candidate will be considered eligible for appearing at the examination at the end of each semester only if he/ she is found to have attended requisite number of classes as per University rules. At the end of each semester theoretical and practical examinations of each paper will be held separately. At the end of the 4<sup>th</sup> Semester there will be a grand *viva-voce*. Each student has to undertake a Summer Training Programme of 8 weeks duration at a Research Laboratory during 2<sup>nd</sup> Semester and an Industrial Training Programme of 2-3 weeks duration at a leading relevant industry during 4<sup>th</sup> Semester. Moreover, after each training period every student will have to submit a detailed report of his/her project and to deliver a seminar lecture as a part of assessment. During 3<sup>rd</sup> and 4<sup>th</sup> Semester each student has to carry out a review work on any area of his/her choice related to Microbiology/ Molecular Biology and has to submit the article before the completion of practical examination of 4<sup>th</sup> Semester and that will be assessed duly in a discussion table in presence of subject experts.

## ACADEMIC CALENDAR (2011 – 2013)

Semester	Duration	Course No.	Subject
1 <sup>st</sup>	5 <sup>th</sup> September 2011, to 4 <sup>th</sup> week of January, 2012	1.1	Basic Microbiology (T)
		1.2	Biochemistry & Biophysics(T)
		1.3	Microbial metabolism (T)
		1.4	Basic Microbiology (P)
		1.5	Biochemistry & Biophysics(P)
		1.6	Microbial metabolism (P)
<b>First Semester Examination</b>			
2 <sup>nd</sup>	1 <sup>st</sup> week of February, 2012 to 3 <sup>rd</sup> week of August 2012	2.1	Molecular Biology (T)
		2.2	Microbial Genetics (T)
		2.3	Recombinant DNA Technology (T) Biomathematics,
		2.4	Agricultural Microbiology (T)
		2.5	Molecular Biology (P)
		2.6	Microbial Genetics (P)
		2.7	Recombinant DNA Technology (P)
		2.8	Agricultural Microbiology (P)
<b>Summer training at National Laboratories (8 Weeks)</b>		<b>During 2<sup>nd</sup> semester</b>	
<b>Second Semester Examination</b>			
3 <sup>rd</sup>	4 <sup>th</sup> week of August 2012 to 1 <sup>st</sup> week of February 2013	3.1	Biostatistics & Computational Biology (Bioinformatics) (T)
		3.2	Immunology and Medical & Diagnostic Microbiology (T)
		3.3	Environmental Microbiology (T)
		3.4	Biostatistics & Computational Biology (Bioinformatics) (P)
		3.5	Immunology and Medical & Diagnostic Microbiology (P)
		3.6	Environmental Microbiology (P)
<b>Third Semester Examination</b>			
4 <sup>th</sup>	2 <sup>nd</sup> week of February 2013 to 2 <sup>nd</sup> week of August 2013	4.1	Food Microbiology (T)
		4.2	Bioprocessing Technology & Industrial Microbiology (T)
		4.3	Application of Microbial Technology (T)
		4.4	Food Microbiology & Application of Microbial Technology (P)
		4.5	Bioprocessing Technology & Industrial Microbiology (P)
<b>Fourth Semester Examination</b>			
<b>Project work at Industries (2-3 Weeks)</b>		During 4 <sup>th</sup> semester	
<b>Review Work /Project Writing</b>		During 3 <sup>rd</sup> and 4 <sup>th</sup> Semester	
<b>Publication of Final Result</b>		3 <sup>rd</sup> week August, 2013 (tentatively)	

T = Theory P =Practical

## Course Structure : Microbiology & Microbial Technology

Semester	Course No.	Subject	Full Marks	Total
1 <sup>st</sup>	1.1	Basic Microbiology (T)	100	340
	1.2	Biochemistry & Biophysics (T)	80	
	1.3	Microbial metabolism (T)	50	
	1.4	Basic Microbiology (P)	40	
	1.5	Biochemistry & Biophysics (P)	40	
	1.6	Microbial metabolism (P)	30	
2 <sup>nd</sup>	2.1	Molecular Biology(T)	50	290
	2.2	Microbial Genetics(T)	50	
	2.3	Recombinant DNA Technology (T)	50	
	2.4	Agricultural Microbiology(T)	30	
	2.5	Molecular Biology(P)	30	
	2.6	Microbial Genetics(P)	30	
	2.7	Recombinant DNA Technology (P)	30	
	2.8	Agricultural Microbiology(P)	20	
3 <sup>rd</sup>	3.1	Biomathematics, Biostatistics & Computational Biology (Bioinformatics) (T)	60	290
	3.2	Immunology and Medical & Diagnostic Microbiology (T)	90	
	3.3	Environmental Microbiology (T)	50	
	3.4	Biomathematics, Biostatistics & Computational Biology (Bioinformatics) (P)	30	
	3.5	Immunology and Medical & Diagnostic Microbiology (P)	40	
	3.6	Environmental Microbiology (P)	20	
4 <sup>th</sup>	4.1	Food Microbiology(T)	30	280
	4.2	Bioprocessing Technology & Industrial Microbiology (T)	80	
	4.3	Application of Microbial Technology (T)	80	
	4.4	Food Microbiology & Application of Microbial Technology (P)	50	
	4.5	Bioprocessing Technology & Industrial Microbiology (P)	40	
	Grand Viva-voce		50	200
	Review Work/Project Writing		50	
	Summer training seminar		50	
	Industrial training seminar		50	
<b>TOTAL</b>			<b>1400</b>	

T = Theoretical P = Practical

### Hostel Facility

Accommodation in the University hostels shall be provided to the students taking admission to the course depending on the availability of seats. However, students have to bear the hostel charges and rent as per University rules.

*Note* : In matters other than those mentioned above, the rules, practices and principles prevailing in the University shall apply.

### Contact address

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