

Department of Biochemical Engineering and Biotechnology
Minutes of the Departmental Faculty Board Meeting
(DFB-05/2023-2024)

10/01/2024

The fifth meeting of the *Departmental Faculty Board* for the academic session 2023-2024 was held on **Friday, January 5, 2024**, at **03:00 PM** in the Committee Room of the Department. The main agenda of this meeting was to discuss the course list for the current semester and resolve any issues related to any of the courses.

The following members were present:

Prof. Ritu Kulshreshtha, Chairperson
Prof. Prashant Mishra
Prof. Sunil Nath
Prof. D. Sundar
Prof. Preeti Srivastava
Prof. Ziauddin Shaikh Ahammad
Prof. Ashish Misra
Prof. Ishaan Gupta
Prof. Lucinda Doyle
Prof. Kumari Priti Sinha
Prof. Anjan Roy
Prof. Amit Das, Convener

Item 1: Confirmation of minutes of the previous special DFB meeting held on October 6th, 2023

*The minutes of the previous DFB meeting (DFB-04 of 2023-24) held on **October 6th, 2023**, were discussed, and confirmed. It was a special DFB to discuss the revisions to the IITD curriculum proposed by the curriculum review committee (CRC). HOD informed the DFB that there has been a slight modification of the PLN03F budget allocation – three desktops for Profs PS, AD, and RK, instead of two desktops and one laptop as discussed earlier.*

Item 2: Finalization of Courses floated this semester - Courses Add/Drop

Prof LED brought to DFB's attention a problem for some students in the graduating batch who cannot complete 10 DE credits required to graduate. This is because they need a 4 credit course to make 10 DE credits. BBL742 is the only 4 credit course offered by the department this semester and it has a cap of 30. So, BBL742 cannot accommodate all the UG 4th year students. In addition, there is multiple slot clash of other DE courses available to them. So, they couldn't go for 4 such courses either.

Prof ZAS, the instructor of the course BBL742, clarified to the DFB that the cap of 30 was decided in the previous semester when the course list was being made. It was necessary due to the limitation of the capacity of the current WTL facility for the lab component of this course and the institute guidelines that courses can only have caps like 30/60/90/150/300.

DFB discussed a short-term solution to remove the slot clashes: moving BBL342, the only DE course offered solely for UG students, to a different slot so that the students can register there to fulfil the 10 credit limit. The proposed slot change of BBL342 was from H to K which is an afternoon-evening mixed slot. Prof AD highlighted that this slot change might be a problem for other registered students in BBL342 apart from those in the graduating batch, like the 2nd year UG students. DFB suggested this change can be done if there is no further slot clash for any. The updated course list from DBEB is attached as annexure 1.

DFB, however, suggested that such problems may arise in future as well. One solution is to offer additional 4 credit DE courses from the department. Another alternate solution could be offering a 1 credit BBV course by a visiting faculty. In this connection, HOD presented in front of DFB the

application from Prof. Indranil Biswas, Professor of Microbiology and molecular genetics at KUMC, USA to conduct a course through the GIAN scheme (details attached as annexure 2). DFB suggested that he should be requested to reformat the proposed course using our course template in time so that his course can be approved and floated in the ongoing semester or sometime in the near future. DFB also suggested that a long-term solution to such issues could be reached by offering more 1 credit courses in future.

Item 3: BTP and MTP student allotment

Prof KPS presented the list of BTP-1 students from last semester who received an F grade and mentioned that they were asked to provide some options for the faculty supervisor of their choice to complete the BTP-1 in the ongoing semester. DFB recommended that these students should be asked to first meet the faculty of their choice. The supervisors will be allocated after both student and faculty agree mutually to start.

DFB also discussed the modality of the MTP supervisor allotment. DFB recommended Prof AR to request the MTech students to meet the various faculty, familiarize with their work and then provide one or two choices each.

Item 4: Finalization of the DBEB vision Document

Following points were discussed by the DFB to finalize the DBEB vision document:

- Connecting with the Alumni – The 1998-BTech batch alumni have expressed interest to be involved with the department. HOD will coordinate with them to learn about their vision for the department.
- New partnerships – Prof KJ and Prof Ravi will be requested to coordinate industry connections.
- Recruitment – COP to revisit short-listing criteria for next cycle.
- Curriculum revision – HOD requested the faculty to revisit the existing course templates finish this in about a month's time. The faculty in the same domain are requested to collaborate on domain-specific courses.
- Proposal to DBT for MTech program – DFB suggested that this should be included in the vision document. However, DFB considered that eligibility for a DBT grant for MTech program can be an issue because of their current policy of entry through GATB exam. A solution could be allowing students through GATB as sponsored students. DBT might have a set criteria on the type of the courses also, therefore DFB recommended that the model DBT guidelines should be looked at thoroughly.
- Infrastructure requirement for four different domains – HOD requested the domain specific faculty coordinators to provide this after discussing among the other members in the respective domains.

Item 5: Space Committee Updation

HOD informed the DFB that Prof Anjan Roy will be included in the updated space committee in place of Prof D. Sundar. The updated member list to be attached in annexure 3.

Item 6. Allotment of lab space to Prof. Priti Sinha

HOD informed the DFB that Lab I-25 has been allotted to Prof Priti Sinha. The space previously occupied by Prof Priti's group (space in Prof Ishaan's lab) is to be used by Prof Anjan's students. DFB recommended that the big experimental labs should be shared by multiple faculty. This will allow the new faculty to get some laboratory space right at the beginning and settle down quickly. HOD requested Prof SN to provide the keys to the occupied room in 2nd floor which can be renovated for the new faculty.

Item 7. Discussion on ECS/BAP agenda items

a) Leave rules for PhD students

<https://owncloud.iitd.ac.in/nextcloud/index.php/s/AAH6eK6taKBiZ2p> - DFB is fine with the proposed leave rules.

b) To consider proposal for recognizing Swayam (NPTEL) Courses in IIT Delhi

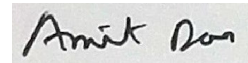
<https://owncloud.iitd.ac.in/nextcloud/index.php/s/KTAzt27S3spfsQC> - DFB commented that the proposal for UG is fine. For PG (MTech, PhD) this may be allowed through recommendation from DRC to fulfil additional course requirements.

c) To consider the proposal of MS (R) in Healthcare Technology by the Centre for Biomedical Engineering <https://owncloud.iitd.ac.in/nextcloud/index.php/s/G2xwZbXieH2ncD6> - HOD requested the faculty teaching the BBL courses referred in the proposal to send their comments on the concerned courses.

Item 8. Any other item with the permission of the Chair.

- i. DFB recommended that organizing seminars should be made a core responsibility for the BETA society. Attending seminars should be made mandatory for PhD and Master's students to attend.
- ii. Possible date for Biosphere' 24 – 02nd March 2024.
- iii. Prof PS and Prof. RE is requested by HOD to schedule the overall safety and meeting for PG and PhD students.

The meeting ended with a vote of thanks to the chairperson.



**Amit Das,
DFB Convener**

Annexure 1

Courses to be floated in Semester II, 2023-2024

Available caps*: 30 / 60 / 90 / 150 / 300

***deviations require justification to Institute (e.g. to accommodate lab capacity)**

Departmental Core Courses (DC)

B.Tech

SI	Course Number	Course Title	L - T - P Structure			Credits	Course Coordinator	Slot	Cap
			L	T	P				
1	BBL431	Bioprocess Technology	2	0	0	2	AM	C	90
2	BBL432	Fluid Solid Systems	2	0	0	2	KPS	H	90
3	BBL433	Enzyme Science and Engineering	3	0	2	4	RE	D	90
4	BBL434	Bioinformatics	2	0	2	3	IG	F	90
5	BBQ301	Seminar Course – I	0	0	2	1	SN	P	30
6	BBQ302	Seminar Course – II	0	0	2	1	SN	P	30
7	BBD452	Major Project Part 2 (BB1)	0	0	16	8	KPS	Q	30

M.Tech

8	BBL774	Biomolecular Engineering	3	0	2	4	DS/PS	D	60
9	BBL775	Bioreaction Engineering	3	0	3	4.5	AN	B	60
10	BBL731	Bioseparation Engineering	3	0	3	4.5	KJM	F	60
11	BBD856	Major Project Part 2 (BEM)	0	0	24	12	AR	Q	60

ELECTIVES

12	BBL736	Dynamics of Microbial Systems	3	0	0	3	AR	J	60
13	BBL742	Biological waste treatment	3	0	2	4	ZAS	AB	30
14	BBL342	Physical and chemical properties of biomolecules	2	1	0	3	AD	K	60
15	BBL745	Combinatorial Biotechnology	3	0	0	3	PS	J	60
16	BBL757	Electromicrobiology and Bioelectrochemical Systems	3	0	0	3	LED	H	60
17	BBL747	Bionanotechnology	3	0	0	3	PM	B	60

MSR/PhD Courses

SI	Course Number	Course Title	L - T - P Structure			Credits	Course Coordinator	Slot	Cap
			L	T	P				
18	BBD895	Major Project	0	0	72	36	LED	Q	60

Annexure 2

Biswas, Indranil

Global Initiative of Academic Network

(Faculty from outside India only can use this format)

Name of Faculty: Prof. Indranil Biswas, PhD
Affiliation: Department of Microbiology, Immunology and Molecular Genetics
University of Kansas Medical Center
Address: 3901 Rainbow Boulevard, Kansas City, KS 66160 USA
Contact No: +1-913-588-7019
Email: ibiswas@kumc.edu

COURSE TITLE: INNOVATIVE AND UNEXPLOITED RESOURCES TO COMBAT SUPERBUGS

BROAD AREA: Infectious Disease, Bacterial Pathogenesis, Drug-discovery, Genomics and Proteomics, Biotechnology, Molecular Microbiology.

OVERVIEW:

This short-term course is designed for upper-level undergraduates or graduate students in the field of Medical Sciences (MBBS), Microbiology Program, Biotechnology Program, or similar disciplines. The course will first provide a brief introduction to various bacterial pathogens and the diseases they cause. The course will discuss in detail about the basic forms and functions of antibiotics. The student will learn to distinguish among the molecular targets of numerous antibiotics and understand the mode of action for various groups of antibiotics. Students will develop knowledge of the history of antibiotic discovery as well as the modern strategies for antibiotic development and discovery. Students will also gain an understanding of the current challenges for treating infectious diseases, increasing abundance of antibiotic-resistant pathogens (superbugs), and novel out-of-box strategies for new antibiotic discovery. The course will also describe recent advancement of bacteriophage research for clinical treatment. The course will discuss how the new knowledge of the human microbiome can help to develop alternative strategies to control life-threatening human infectious diseases. Finally, the course will describe community responsibility and antibiotic stewardship to combat emerging deadly superbugs.

This short-term course will be equivalent to **US 1-credit course** (15 contact hours). The estimated duration of the course will be 7-10 days. The class will meet every day during the course and each session will be about 1.5 -2 hours depending on the format. Although this is a lecture-based (didactic) course, primary literature will be discussed on alternative days as take-home assignments. The instructor will present topics and explain the main ideas. Then primary literature relevant to the topics will be assigned to the students. Students (selected randomly) are expected to give a 10–15-minute oral presentation on the assigned papers followed by discussion involving the entire class. Basic knowledge of microbiology and/or biology is a prerequisite for this course.

C. COURSE LEARNING OUTCOMES: By the end of this course, students will be able to:

1. Understand and describe past and present approaches to antibacterial drug discovery and its unique challenges.
2. Understand and describe the modern arsenal of therapeutics and their mode-of-action.
3. Molecular mechanisms of antibiotic resistance development and dispersion.
4. Identify current ideas about how to search for the new drugs of the tomorrow.
5. Novel strategies to develop new antibacterial compounds and determination of mode-of-action.
6. Alternate treatment strategies to control infectious diseases; think-outside-the-box.

COURSE DETAILS:**Topic 1: The diverse world of bacteria: the basic, the benign, the beautiful and the bad:**

An introduction of the wonderful world of bacteria, features of bacteria, bacterial classification, unique bacterial species, the ecological niche, microbiome, and general methods used to study bacteria.

Topic 2: A brief history of infectious disease and antibiotics discovery, and overview of major classes of antibiotics and their targets:

An introduction to bacterial pathogens and the diseases they cause, and the methods to control the infections in pre-antibiotics era. A brief introduction to antibiotics discovery. Role of modern synthetic chemistry in antibiotics development. Discuss broadly how antibiotics target various biosynthesis pathways, what are the main drawback in each class. Bacteriostatic vs bactericidal antibiotics and pros/cons of each and how to determine the activities in planktonic vs biofilm-based culture.

Topic 3: Detail analysis of how antibiotics inhibit bacteria:

Key steps in cell-wall biosynthesis pathways, major classes and various generations, mechanism of cell membrane disruption, DNA and RNA transaction pathways, how antibiotics inhibit specific enzyme function, targetting folate biosynthesis, deoxythymidilate, and fatty acid biosynthesis pathway. Step involved in ribosome biogenesis and protein translation, antibiotics that target various steps, classification of various groups, and procedures to identify the mode-of-action. Implication in drug discovery.

Topic 3: Basic mechanisms of bacterial resistance to antibiotics:

Various strategies used by bacteria to combat antibiotics, resistance due to lifestyle of growth condition, modification or destruction of the antibiotics, membrane efflux pumps, target modification, dissemination of resistance genes in the environment, understanding regulation of bacterial resistance.

Topic 4: Soil microbiology and their importance in antibiotic discovery and resistance:

Introduction of soil microbial ecology and diversity, importance of various soil bacteria in plant and crop health, cell-cell communication among various species and potential for natural product discovery; spread of antibiotic resistant genes among soil bacteria.

Topic 5: Antibiotic biosynthesis gene clusters, bacteriocins, and synthetic peptide antibiotics

Principles of antibiotics biosynthesis, biosynthesis of polyketides, oligosaccharides, isoprenoid, and C-P antibiotic classes and other BGC products, biosynthesis of peptide antibiotics and bacteriocins (RiPP) and their regulation, other peptide antibiotics

Topic 6: Antimicrobial discovery strategy using novel techniques:

High throughput screening techniques, repurposing existing FDA approved drugs, novel drug development using a variety of approaches such as looking for drug in new environment, rational designing, iChip technology for uncultivable organisms, mining genomic, proteomic data, mining microbiome for novel compounds, use of AI and machine learning for drug discovery.

Topic 7: Approaches used for determination of mode-of-action of antimicrobials:

The use genomic, transcriptomics and proteomics assays to identify MoA, bacterial cytological profiling, chemical genomics, gain/loss of function assays, and molecular biology and genetics.

Topic 8: Innovative strategies to overcome antibiotics resistance:

Combination therapy, drug conjugation, bacteriophage therapy, fecal transplant, identification of new targets, taming the virulence/pathogenic genes, antibody therapy and others, use of probiotics and pre-biotics; beneficial bacteria; taming the virulence/pathogenic genes, use next-generation approaches such as nano-particles.

Topic 9: Tools and techniques used for antibiotic research:

Routine clinical microbiological techniques, various state-of-the-art microfluidics methods, single cell genomics, cell-free protein expression for HTS assay, use of synthetic biology in drug discovery and functional assay, animal models (vertebrate and invertebrate) used for antibiotic effectiveness.

TEXTS AND REFERENCES:

The instructor will provide electronic and/or printed copies of essential reading materials for the course. The students are encouraged to use the following texts for background and supporting information.

Antibiotics: Actions, Origins, Resistance. Walsh, Christopher. ASM Press; 2016

Antibiotic Resistance: Implications for Global Health and Novel Intervention Strategies: Workshop Summary by Institute of Medicine, National Academies Press; 2020

Antibiotics Simplified by Jason C. Gallagher and Conan MacDougall. Jones & Bartlett Learning; 2016

POPULAR READS:

Miracle Cure: The Creation of Antibiotics and the Birth of Modern Medicine. William Rozen. Penguin Books; 2018

Penicillin Man: Alexander Fleming and the Antibiotic Revolution by Brown. The History Press; 2005

The Mold in Dr. Florey's Coat: The Story of the Penicillin Miracle by Eric Lax. J MacRae Books; 2004

Superbugs: The Race to Stop an Epidemic by Matt McCarthy. Scribe UK; 2019

Antibiotic Resistance: Understanding and Responding to an Emerging Crisis: by Karl Drlica, David S. Perlin. Ft. Press; 2011

Revenge of the Microbes: How Bacterial Resistance Is Undermining The Antibiotic Miracle: by Abigail A. Salyers, Dixie D. Whitt. ASM Press; 2005

Viruses vs. Superbugs: A Solution to the Antibiotics Crisis? by Thomas Hausler. Palgrave Macmillan; 2006

Growing Resistance with Antibiotics: by Karl Drlica, David Perlin. Pearson; 2011

Useful videos:

<http://www.pbs.org/wgbh/frontline/film/trouble-with-antibiotics/>

<https://www.youtube.com/watch?v=EkyAuG9RSSU>

<https://www.youtube.com/watch?v=tdapW7FCbLM>

<https://www.pbs.org/wgbh/frontline/film/hunting-the-nightmare-bacteria/>

EVALUATIONS:

This course is designed for non-grading course (satisfactory and non-satisfactory). However, if a grading is required it will be based on the following criteria:

Attendance and Participation: 40%
Presentation and Discussion: 60%

The letter grades: A: 80% or above
 B: 70%-79%
 C: 60%-69%
 D: Below 60% (fail)

Students in the course will be required to respond to and generate questions about the material during each session (attendance and participation). Each student will prepare a short discussion for the group on the article(s) of their assignments during the course (presentation/discussion). Each student is expected to submit a final assignment of approximately 1000-word either reflecting the course or on some overarching questions. This final assignment will be also counted toward grading.

WHO CAN ATTEND:

1. Upper-level undergraduates or graduate students (BSc/BTech/MSc/MTech/Integrated MSc/ PhD) in the field of Biological Sciences, Microbiology Program, Biotechnology Program, or other related disciplines.
2. Undergraduate students in Medical Sciences (MBBS) and post-graduate (MD/MS/DNB) students specializing in Clinical Microbiology and Infectious Diseases.
3. Undergraduate and graduate students enrolled in Pharmaceutical Sciences or Medicinal Chemistry (BPharm/MPharm/BSc/MSc).
4. Faculty (junior or senior) from the related disciplines and scientists working at academic research institute.

Course Timeline (Tentative): March or April 2024

TEACHING FACULTY:

Prof. Indranil Biswas. Dr. Indranil Biswas received his BSc (Ag Hons) degree from BCKV University, India and MSc degree in Biotechnology from Madurai Kamaraj University, India. He received his PhD in Microbiology from University Paris VII, France. After completing his graduate studies, he joined National Institutes of Health (NIH) in Bethesda, Maryland for his post-doctoral training. In 1998 he joined National Centre for Cell Science, Pune, India as a senior scientist but left the position in 2000 to join the faculty at Emory University and then moved to University of South Dakota. Currently, he is a professor in the Department of Microbiology at the University of Kansas Medical Center. His main research interests are in the areas of bacterial pathogenesis and antimicrobial discovery/development. He has over 80 peer reviewed research articles, reviews, and book chapters. He serves as an editor of *mBio*, an esteemed ASM journal. He also serves as an editor for a few other international journals including *PLoS*, *Wiley* and *Elsevier* journals. In addition, he serves in the editorial board of many international journals including ASM journals. For over a decade, Dr. Biswas serves as a reviewer for many national and international funding agencies, including many NIH Study Sections. He is also a member of Faculty of 1000, which publishes recommendations of articles in biology and medicine. His current research program is supported by NIH and other funding agencies. In 2014, Dr. Biswas was selected as a Fulbright Senior Scholar Fellow to study epidemiology of antimicrobial resistance of ESKAPE pathogens in India and spent four months at Christian Medical College, Vellore, India. He was also invited to serve as a book editor (Wiley) for genetic manipulation of *A. baumannii* in 2017. Furthermore, he was awarded an ASM-IUSSTF Indo-US Professorship in Microbiology in 2018 to teach and conduct a short workshop on antimicrobial resistance related to ESKAPE pathogens at Vellore Institute of Technology, India.

At the KU Med Center, he served as an advisor for nearly 5 years to the Interdisciplinary Graduate Program in Biomedical Sciences (IGPBS: <https://www.kumc.edu/igpbs.html>), an umbrella graduate program that recruits students for the entire institute. He currently serves in the Curriculum Development Committee that oversees the IGPBS curriculum. He also served as the Graduate Program Director for the Microbiology Department for over five years. Currently, he is the course director for two graduate level courses (MICR811 and MICR820) as well as an instructor/facilitator for the CBCL course for first year medical students at KU Med Center.

Annexure 3

Updated space committee

Space Planning and Utilization (including relocation to the new building 99C1)	HoD, Ravikrishnan Elangovan, Ziauddin Shaikh Ahammad, Preeti Srivastava, Anjan Roy
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