



## *Department of Biochemical Engineering and Biotechnology*

*Welcomes*

*New PhD and MSR students  
(Sem 1, 2020-21)*

<http://beb.iitd.ac.in/>



# Schedule: PG Orientation

Details	Concerned person	Timing
Welcome and Introduction to the dept	Prof. D. Sundar, Head, DBEB	10.00 am
Introduction to Departmental Research Committee	Prof S. Sharma, DRC Chair, DBEB	10.10 am
Introduction to individual faculty	Faculty members	10.20 am
Individual introduction by new PhD students	PhD students	10.40 am
Individual introduction by new MSR students	MSR students	11.05 am
Introduction to the programme	Prof. R. Jain, PhD & MSR Coordinator	11.20 am
Q&A session		11.40 am
Formalities related to Course registration	Prof R. Jain, PhD & MSR Coordinator	11.55 am

# Departmental Research Committee (DRC)

- Sub-committee of Departmental Faculty Board
- Role: Research related activities, PG students
- Members include: Head, PhD & MSR Coordinator besides others

# DRC's role during your tenure

- Screening and selection of students
- Allotment of Supervisors and Projects to students
- Form Student Research Committees (SRCs) for each PG student
- Conducts comprehensive examination
- Approval and/or forwarding of all documents related to your milestones (Comprehensive, Synopsis, Thesis)
- Applications forwarded through your supervisor: travel awards, internships, leave requests
- Addresses grievances, if any

# Student Research Committee

- Other than supervisors(/s) 3 members for PhD students, and 2 members for MSR students
- Monitoring of progress preferably every semester and minimum once a year



## Our strengths...

- Interdisciplinary research: Inter-departmental and intra-departmental collaborations
- State of the art equipments in common facilities and individual labs
- MoUs for exchange programmes
- Average of 3.5 impactful publications per PhD student
- Placements of our students

# What we offer to you?

- Travel awards (International Conferences): RSTA, RETA
- Awards: Research Scholar Day, Open House
- Nomination for PMRF: Lateral entry
- Possibility of conversion to Ph.D. (for MSR students)
- Participation in International competitions like iGEM
- Internships abroad

# Recent internships by Ph.D. students (in 2020)

- Denmark Technological University: Arif, Shivani
- Helmholtz Zentrum Dresden-Rossendorf: Priyanka
- NTHU Taiwan: Navaneethan
- Frierich Schiller Univ., Germany: Deepak
- Univ. of Lille, France: Swati
- Univ. of Edinburgh: Dhvani
- Ulm Univ: Soumya
- Univ. of Fribourg, Switzerland: Shubham

*Sponsorship/Fellowship:*

➤ *Newton Bhabha, Raman Charpak, DAAD ...*



# Our Alumni

## Academia

- Postdocs: NIH, CDC, AIST, Univ of Nottingham, Washington Univ, Boston Children's Hospital, Texas A&M Univ, THSTI, NII, IITs
- Faculty: Delhi Univ, JNU, IITs, NITs
- Scientists: NEERI, CPCB, MoEF, DRDO

## Industry

- Dr Reddy's, IOC, BPCL, Syngene Intl, Lonza Biologics, Intas Pharmaceuticals, MathWorks, Eone Diagnostics Genome Centre...

## Entrepreneurs

- Valetude Primus Health Care Pvt. Ltd.



# What we expect from you?

- Grade requirement
- Utmost dedication and sincerity to meet the deadlines related to your programme
- Plagiarism-free environment
- Honour Code, healthy work environment
- TAsip: service to the department

## PhD and MSR@DBEB

- 69 Ph.D. students are on roll; 4 submitted synopsis
- 17 MSR students are on roll

## PhD students, Entry Sem I, 2020-21

Name	Supervisor	Entry No.	Assistantship
Abhilash Dasari	IG	2020BEZ8510	CSIR-JRF
Akshay Ravindra Lohakare	AN	2020BEZ8511	CSIR-JRF
Aratrika Ghosh	RJ	2020BEZ8512	Institute assistantship
Asheemita Bagchi	PS	2020BEZ8513	Institute assistantship
Juwayria	IG	2020BEZ8514	UGC-JRF
Khadeeja Parveen	TRS	2020BEZ8515	Institute assistantship
Kolli Venkata Supraja	RJ	2020BEZ8516	Institute assistantship
Mahenaz Haneef	ZAS	2020BEZ8517	Institute assistantship
Monika Luthra	LED	2020BEZ8518	UGC-JRF
Nikita Deshwal	ZAS	2020BEZ8519	Institute assistantship
Pallavi Chakraborty	AN	2020BEZ8520	Institute assistantship
Preetha Ganguly	PM	2020BEZ8521	Institute assistantship
Palistha Tuladhar	AM	2020BEZ8568	Institute assistantship
Rashi Tyagi	SS	2020BEZ8525	DST-Inspire
Salila Pradhan	SS	2020BEZ8522	CSIR-JRF
Shivali Ravindra Mishra	PM	2020BEZ8523	DST-Inspire
Subhashree Pagal	AN	2020BEZ8524	Institute assistantship

# MSR students, Entry Sem I, 2020-21

Name	Supervisor	Entry No.	Assistantship
Anshul Budhraja		2020BEY7515	Institute assistantship
Anuja Sharma		2020BEY7604	Institute assistantship
Nabamita Nandi		2020BEY7516	Institute assistantship
Nandita Fuloria		2020BEY7517	Institute assistantship
Nirmal Singh Mahar		2020BEY7518	Institute assistantship
Qazi Noorul Mateen		2020BEY7605	Institute assistantship
Rhythm Sardana		2020BEY7519	Institute assistantship
Shubham Sharma		2020BEY7520	Institute assistantship

# Activation of PhD assistantship from funding agency

- Students need to contact the funding agency for the necessary documents and formalities
- Get the approval from your supervisor
- The approved forms are routed through the PhD coordinator for signature from HOD

# Time lines of your PhD and MSR

## Your PhD Milestones

Coursework  
@6 - 20 credits

Prepare PhD  
workplan

**1.5y Presentation**  
**C comprehensive exam**

Write  
Paper 1& 2

*TA duties*

**3y Presentation**

Write  
Paper 3

Conference  
*TA duties*

**4y Presentation**

Synopsis  
Thesis writing

**Defend (Max. 5 years with scholarship; another 2 years without scholarship)**

Write post-doctoral Grants

## Your MSR Milestones

Coursework  
@15 credits

Choose your  
project

Possibility to  
migrate to PhD

**6 - 12 months**

Work on thesis

Write  
Papers

**2y - Defend**

# Course work for PhD/MSR

Qualifying degree	Minimum credit requirement - PhD	Credit requirement - MSR
BTech/BE or equivalent	20 credits	9 < C > 15
MSc. or equivalent	20 credits	9 < C > 15
MTech/ME/MD/MSR or equivalent	6 credits*	-

Credit system	Description
Course 3 0 0 = 3 credit course	Three lectures – No tutorial – No practical per week
Course 3 1 0 = 4 credit course	Three lecture – one tutorial – No practical per week
Course 3 1 3 = 5.5 credit course	Three lecture – one tutorial – three hour practical per week

Semester	Minimum grade requirement - PhD	Minimum grade requirement - MSR
I semester	SGPA > 6.0	SGPA >= 7.0
II semester	CGPA > 7.0	CGPA >= 7.0
III semester	DGPA > 7.5	DGPA >= 7.0

*\*DRC has mandated the students to do the 5 courses (13 credits) from the department this semester*



# Grades

Grades	Score	Description
A	10	Outstanding
A-	9	Excellent
B	8	Very good
B-	7	Good
C	6	Average
C-	5	Below average
D	4	Marginal
E	2	Poor
F	0	Very poor
I		Incomplete
NP		Audit pass
NF		Audit fail
W		Withdrawal
X		Project/PhD continuation
S		Satisfactory completion
Z		Course continuation
U		Unsatisfactory progress in PhD

# Course registration

- Needs to be done online each semester
- A course called DTD899 (Doctoral Thesis) needs to be registered by the students every semester until the PhD thesis is submitted.
- A course titled BBD 895 (MSR Thesis) needs to be registered by the students every semester until the MSR thesis is submitted.
- PhD/MSR students can register only for 700 or 800 level courses.
- If the PhD/MSR students audit any course, that will not be included for SGPA/CGPA/DGPA calculations.
- PhD/MSR students cannot do any summer semester course. It will not be considered as a registered semester.
- Humanities course (HSL800 – Research Writing) needs to be completed. No exemption from doing this course will be given. This does not add to any credit.
- Minimum 4 full courses ( $\geq 3$  credit) are needed to apply for lateral PMRF fellowship by PhD students.

# Comprehensive exam for PhD student

- Needs to be completed before 18 months from the date of registration.
- There will be two parts to the comprehensive exam – Written and Oral.
- Two attempts will be permitted for clearing both the written and oral exam.
- More details will be provided by the PhD Coordinator (See back-up slides for syllabus).

# Courses to be registered in this semester

## 1. Departmental courses

Course no.	Course title	Credits	L T P	Coordinator	Slot
BBL 850	Advance Biochemical Engineering	3	3 0 0	K. J. Mukherjee	B
BBL 731	Bioseparation Engineering	3	3 0 0	Rohan Jain	C
BBL 733	Recombination DNA Technology	2	2 0 0	Ritu Kulshreshtha	D
BBL 737	Instrumentation and Analytical Methods in Bioengineering	2	2 0 0	D. Sundar	E
BBL 830	Microbial Biochemistry	3	3 0 0	Lucinda E. Doyle	J

## 2. Humanities

Course no.	Course title	Credits	L T P	Coordinator	Slot
HSL 800	Research writing	3	3 0 0	?	?

## 3. Dissertation courses (*Mandatory registration every semester*)

Course no.	Course title	Credits	L T P	Coordinator	Slot
BBD 895	MSR Research project	36	0 0 0	Rohan Jain	
DTD 899	PhD thesis			Rohan Jain	

*Students can take extra courses after discussion with their supervisors*

# Progress report

- A student's progress will be monitored by a duly constituted Student's Research Committee (SRC).
- Students are required to submit Progress Report at the end of every semester until the thesis is submitted (online)
- The student's progress report will be graded each semester and awarded a 'X' grade (satisfactory) or a 'U' grade (unsatisfactory).
- Minimum one presentation in front of SRC every year after finishing comprehensive exam is must for getting 'X' grade.
- Two successive 'U' grades (in consecutive semesters), would result in termination of registration.

# Attendance rules

- The students are required to login to the academic portal to mark attendance before the 10<sup>th</sup> day of every month; Only then the fellowship will be released.
- Leave eligibility is available in the Courses of study booklet.
- A student, while pursuing course work, must attend at least 75% of classes to get paid.
- The course attendance requirement will be given by respective course coordinators.
- A student, after completing course work, must attend to the research work on all working days and mark attendance, except when he/she has obtained duly sanction leave.
- Use Timble in the department to mark the attendance.

# Migration from MSR program to PhD program

	Criteria
Timing	Before the end of II <sup>nd</sup> semester
Eligibility	> 8.0 SGPA/CGPA; > 12 credits
Admission	DRC evaluation
Credits	Credits transferred as recommended by DRC
Duration	Maximum 7 years from date of joining of MSR program

# Important links

1. Department website - <http://beb.iitd.ac.in/>
2. Course of study booklet - <http://beb.iitd.ac.in/Courses-of-Study-2020-2021.pdf>
3. Slot timings - <http://beb.iitd.ac.in/Slot-Timings.pdf>
4. All the courses offered by the department - <http://beb.iitd.ac.in/Courses-DBEB-2020-2021.pdf>
5. Academic ERP portal for course registration - <https://eacademics.iitd.ac.in/sportal/login>
6. Academic calendar - <https://home.iitd.ac.in/uploads/1stSemester2020-21-RevisedAfterSenateMeeting.pdf>
7. Link to moodle for course related activities - <https://moodle.iitd.ac.in/login/index.php>



**Back-up slide**

# Comprehensive exam syllabus (1/4)

## **Syllabus for Paper 1 Written Comprehensive Examination**

Paper 1 is a compulsory paper for all PhD students of the department. This paper will have two parts – Section A (Bioprocess Engineering) and Section B (Biochemistry, Microbiology and Molecular Biology).

### **Section A**

#### **(Bioprocess Engineering)**

##### **1. Bioreaction Engineering**

- a) Criteria for good mixing of gas, cells, and liquid, and the power required to achieve it.
- b) Scale-up
- c) Formulating steady and unsteady mass balances
- d) Mass transfer of oxygen: Theory and measurement of the mass transfer coefficient
- e) Modes of reactor operation: Batch, continuous, fed-batch, recycle, series
- f) Constructing elemental mass balances and testing consistency of data

#### **Suggested books**

- 1) Doran, P. M. Bioprocess Engineering Principles, ISBN 978-93-81269-83-
- 2) Shuler, M. L. and Kargi, F. Bioprocess Engineering: Basic Concepts, ISBN 978-81-203-2110-6
- 3) Villadsen, J., Nielsen, J., Liden, G. Bioreaction Engineering Principles, ISBN 978-1-4419-9687-9

# Comprehensive exam syllabus (2/4)

## 2. Bioseparation Engineering

- a) Filtration
- b) Centrifugation
- c) Cell disruption
- d) Extraction
- e) Adsorption
- f) Precipitation
- g) Ultrafiltration
- h) Chromatography
- i) Crystallization
- j) Drying

### Suggested books

- 1) Belter, P. A., Cussler, E. L., Hu, Wei-Shu. Bioseparations: Downstream Processing For Biotechnology, ISBN 0-471-84737-2.
- 2) Harrison, R. G., Rudge, S. R., Petrides, D. P. Bioseparations Science and Engineering, ISBN 978-0195391817

# Comprehensive exam syllabus (3/4)

## **Section B**

### **(Biochemistry, Microbiology and Molecular Biology)**

#### **1. Biochemistry**

- a) Biomolecules structure and function
- b) Carbohydrates (monosaccharides, disaccharides and common polysaccharides – starch and cellulose)
- c) Proteins – primary, secondary, tertiary & quaternary structures; glycoproteins
- d) Lipids
- e) Basic metabolic pathways (Glycolysis, TCA cycle, Glyoxalate cycle, Pentose Phosphate pathway).

#### **2. Microbiology**

- a) Organization of prokaryotic and eukaryotic cells.
- b) Structure and function of organelles (mitochondria, endoplasmic reticulum, golgi bodies) of eukaryotic cells.
- c) Microbiological techniques

#### **3. Microbial Genetics and molecular biology**

- a) Structure and function of nucleotides, DNA and RNAs.
- b) Manipulation of nucleic acids - basic tools and techniques
- c) Genes and genome complexity, organization of genomes, Molecular analysis of nucleic acid sequences

# Comprehensive exam syllabus (4/4)

## Section B

4. **Analytical Methods** - Techniques such as Spectrometry, chromatography, electrophoresis

### Suggested Books

- 1) Madigan, M.T, Martinko, J.M and Bender, K.S. Brock Biology of Microorganism, ISBN-13: 978-0321897398.
- 2) Berg, J.M, Tymoczko, J.L. and Stryer, L. Biochemistry, ISBN-13: 978-0716746843.
- 3) Willey, J.M., Sherwood, L., Woolverton, C.J., Prescott, L.M. Microbiology, ISBN 0072992913.
- 4) Freifelder, D., Cronan, J. and Maloy, S.R. Microbial Genetics, ISBN-13: 978-8173196973.
- 5) Brown, T.A. Genomes. ISBN-10: 0-471-25046-5
- 6) Mount, D. Bioinformatics: Sequence and Genome Analysis, ISBN-13: 978-0879697129.
- 7) Wilson, K. and Walker, J. Principles and Techniques of Biochemistry and Molecular Biology, ISBN-13: 978-0521178747.
- 8) Skoog, D.A., Hollder F.J and Crouch, S.R. Instrumental Analysis, ISBN-13: 978-8131505427.