



# “Rational Approaches towards Protein Engineering and Design” (RATPED – 2017) Summer School - July 10<sup>th</sup> - July 14<sup>th</sup> 2017



## About the School

School of Life Sciences has been established with twin objectives of making the campus cross disciplinary and initiating teaching, research and training programs across the areas of life sciences. The school has been visualized to emerge as a hub for state of the art research in all fields related to Bioinformatics, Molecular Biology, Bio-Chemistry, Microbiology, Bio-Technology, Cancer Biology, and Genetics etc., through sponsored projects from industries and Government agencies. It has also been visualized to be a training centre for scientists, researchers, clinical staff of hospitals, industry workers in advanced laboratory techniques with hands on experience, through short term intensive programs. The school offers Undergraduate, Postgraduate and Doctoral programmes in Life Sciences. For more information please visit [www.bsauniv.ac.in](http://www.bsauniv.ac.in)

## About the Summer School

Protein engineering is the design of new enzymes or proteins with desirable functions. It is based on the use of recombinant DNA technology to change amino acid sequences. Engineered enzymes and proteins find numerous industrial applications. Engineered enzymes are in high demand in biofuel, pharmaceutical, detergent, textile, paper / pulp and food industries. However a lot of research is needed to understand protein stability. In view of the potentially huge significance of this field of research, we are taking the initiative to organize lectures and hands-on workshop involving both experimental and computational aspects of Protein Engineering. The summer school will explore in detail the critical aspects and current issues associated with engineering and design of stable proteins. The Summer School is aimed to provide insights into successful applications of rational protein engineering strategies in designing stable enzymes and therapeutic proteins. This year, the focus will be on Protein Engineering approaches studied using various computational methods and PCR based experimental methods. It is expected that the outcomes of this summer school will increase our appreciation of the state of the art of Protein engineering methodologies; stimulation of research in the field in the country and strengthen industrial collaboration. This workshop also will be the starting of our understanding of how the field is being utilised at its fullest in design of industrially useful enzymes and proteins.

## Highlights

- Summer School will have both invited talks from eminent scientists and hands on Sessions
- Invited Talk on “Protein Engg & Stability Prediction” by Prof. Michael Gromiha, IIT Madras
- Invited Talk on “Protein Stability studies” by Dr. Athi Narayanan, IIT Madras
- International Speaker Dr. Janarthanan Krishnamoorthy from Jimma University, Ethiopia will give lecture on “Artificial Intelligence in Protein Stability Prediction”
- Invited Talk on “Current Challenges in Protein Design” by Dr. Shahul Hameed, BSA Crescent University
- **30 hours of Hands on Session** which includes both Experimental wet lab and Computational Biology lab

# Programme Schedule

## Day 1

Time slot	Activity
9.00 a.m – 10.00 a.m	Inauguration and Registration
10.00 a.m – 11.15 a.m	Invited Talk on “Protein Engineering and Stability Prediction” by Prof. Michael Gromiha
11.15 a.m – 11.30 a.m	TEA BREAK
11.30 a.m – 12.30 p.m	Protein Structure & Function - Basics
12.30 p.m – 1.30 p.m	LUNCH
1.30 p.m – 3.30 p.m	Protein Visualization Tools – VMD, Pymol - Hands on Session
3.45 p.m – 4.30 p.m	Protein Databases – PDB, Protherm - Hands on Session

## Day 2

Time slot	Activity
9.00 a.m – 10.00 a.m	Invited talk on “Rational approach Vs Non-rational approach in Protein Engineering” by Dr.Shahul, Crescent University
10.00 a.m – 11.15 a.m	Free Energy Calculations using Molecular Dynamics Simulations – Setting up MD simulations – Hands on Session
11.15 a.m – 11.30 a.m	TEA BREAK
11.30 a.m – 12.30 p.m	Hot Spot Wizard – Design of Mutations and Smart libraries in Protein Engineering – Hands on Session
12.30 p.m – 1.30 p.m	LUNCH
1.30 p.m – 3.30 p.m	Estimating the stability effect of a mutation with FoldX – Hands on Session
3.45 p.m – 4.30 p.m	Disulfide by Design – Hands on Session

## Day 3

Time slot	Activity
9.00 a.m – 10.00 a.m	Invited talk on “Protein Stability” by Dr.Athi Narayanan, IIT Madras
10.00 a.m – 12.30 p.m	Mutagenic PCR – Primer Design – Hands on Session
12.30 p.m – 1.30 p.m	LUNCH
1.30 p.m – 3.30 p.m	Site Directed Mutagenesis by PCR – Experimental – Hands on Session
3.45 p.m – 4.30 p.m	Gel Electrophoresis and Ligation - Experimental – Hands on Session

## Day 4

Time slot	Activity
9.00 a.m – 10.00 a.m	Invited Talk on “Artificial Intelligence in Protein Stability Prediction” – Dr.Janarthanan Krishnamoorthy, Jimma University, Ethiopia
10.00 a.m – 12.30 p.m	Transformation - Experimental – Hands on Session
12.30 p.m – 1.30 p.m	LUNCH
1.30 p.m – 2.30 p.m	MD simulation result Analysis - Hands on Session
2.30 p.m – 4.30 p.m	Protein Stability Prediction Tools – Hands on Session

## Day 5

Time slot	Activity
9.00 a.m – 10.00 a.m	Invited Talk on “Current Challenges in Protein Design” by Dr.Shahul Hameed, BSA Crescent University
10.00 a.m – 11.15 a.m	Screening of transformed colonies - Experimental – Hands on Session
11.15 a.m – 11.30 a.m	TEA BREAK
11.30 a.m – 12.30 p.m	De Novo Enzyme Design Using Rosetta – Hands on Session
12.30 p.m – 1.30 p.m	LUNCH
1.30 p.m – 3.30 p.m	De Novo Enzyme Design Using Rosetta – Hands on Session
3.45 p.m – 4.30 p.m	Valedictory Address

**COURSE FEE:** UG/PG 3000/- per participant.

Research Scholar 4000/- per participant.

Faculty and Industry Person 5000/- per participant.

Fee includes workshop manual, certificate, and refreshment.

**ELIGIBILITY:** UG, PG, Research Scholars, Faculty and anyone who is interested in learning.

**INSTRUCTION TO PARTICIPANTS:** Total number of participants will be 25; Boarding and lodging can be arranged based on request (Separate Charge).

**FEE PAYMENT DETAILS:**

**For Account transfer:** Indian Overseas Bank, Acc No. 165701000019853, IFSC code: IOBA0001657 in favour of Dean, School of Life Sciences.

**For Demand Draft:** DD should be drawn in favour of Dean, School of Life Sciences, B.S.Abdur Rahman University payable at Vandalur, Chennai.

**For Cheque:** Cheque towards Dean, School of Life Sciences, B.S.Abdur Rahman University payable at Vandalur, Chennai.

**VENUE**

School of Life Sciences (SLS)

B.S.Abdur Rahman University,

Vandalur, Chennai-48.

Adjacent to Anna Zoological Park.



**FOR FURTHER COMMUNICATIONS CONTACT**

ORGANIZING SECRETARY	ORGANISER	IMPORTANT DATES
Prof. S. Hemalatha	Dr.M.S.Shahul Hameed	Last date for Registration: 1 <sup>st</sup> July 2017
Dean School of Life Sciences (SLS)	Asst. Prof., School of Life Sciences (SLS)	Workshop date: 10 <sup>th</sup> - 14 <sup>th</sup> July 2017
B.S.Abdur Rahman Crescent University, Chennai	B.S.Abdur Rahman Crescent University, Chennai	
Phone: 044-22759215 Ext. 215	Phone: 044-22759200 Ext 380, 9751352730 (Mobile)	
Email: dean.sls@bsauniv.ac.in	E mail: shahulhameed.sls@bsauniv.ac.in	