Indian Institute of Science

Department of Bioengineering

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BE227: Synthetic Biology and Protein Engineering

(2:0)- January semester

Course Code:	BE227
No. of Credits:	2
	PhD, Int-PhD, Masters (M.Sc and M.Tech) and Under graduate (4^{th} or 5^{th} year, Biology Major)
Class Timing:	**Wednesday and Friday 09:00 to 10:00 am at Biochemistry Lecture Hall (BCLH)**
Course Instructors:	Prof. Deepak Saini (DBG) Dr. Saravanan Palani (BC)

Introductory class on: 07th January, 2026 at 9:00 am at Biochemistry Lecture Hall (BCLH)

Course Description:

Part I : Concepts and practice of synthetic Biology; genetic engineering; synthetic biology in healthcare; basic research; environment; engineering. Impact of synthetic biology of culture and life. Evidences from Genetically engineered machines development through seminar series.

Part II : Genetic Code Expansion and Protein Engineering**:** This part of the course explores the principles and applications of genetic code expansion, a powerful tool in synthetic biology and protein engineering. The course will cover the significant aspects of the molecular and cellular mechanisms underlying genetic code expansion, learn about the various methods for incorporating non-natural amino acids into proteins, and explore the diverse applications of this technology in areas such as drug discovery, receptor-ligand interaction, and biotechnology.

References:

“Expanding and reprogramming the genetic code”, Nature. 2017 Oct 4;550(7674):53-60. doi: 10.1038/nature24031.
“Expanding the genetic code”, Annu Rev Biophys Biomol Struct. 2006:35:225-49.
“A chemical toolkit for proteins--an expanded genetic code”, Nat Rev Mol Cell Biol. 2006 Oct;7(10):775-82. doi: 10.1038/nrm2005.
“Expanding the genetic code for biological studies”, Chem Biol. 2009 Mar 27;16(3):323-36. doi: 10.1016/j.chembiol.2009.03.001.

Textbook: "Genetic Code Expansion: Methods and Protocols" edited by Jason W. Chin