Semester	AUG 2022
Open to semester	7,13,21
Course code	**CH4164/CH6314**
Course title	**Bioorganic Chemistry and Chemical Biology**
Credits	4 /4
Course Coordinator & participating faculty (if any)	S. G. Srivatsan
Nature of Course	Lectures
Pre-requisites	none
Objectives (goals, type of students for whom useful, outcome etc)	This course is intended to provide a basic knowledge on the biosynthesis of biomolecule precursors and certain natural products. The content of this course is a chemistry-based approach to understanding the basic structure, reactivity, biological functions and biosynthesis of precursors–amino acids, nucleotides, fatty acids, lipids and secondary metabolites. This course will also provide an overview of the field of chemical biology, while integrating chemical, biochemical, biological and biophysical approaches. The course structure will provide chemists with biologically relevant new targets and biologists with useful new chemical tools.
Course contents (details of topics /sections with no. of lectures for each)	1. Overview of structure of nucleic acids, proteins, carbohydrates, and lipids (6 h). 2. Primary and secondary metabolism, bioenergetics, biological reaction mechanisms, coenzymes/cofactors (6 h). 3. Amino acids: biosynthesis of aliphatic and aromatic amino acids (4 h). 4. Biosynthesis of nucleosides and carbohydrates (3 h). 5. Beta-oxidation of fatty acids, biosynthesis of fatty acids, lipids, polyketides, and representative secondary metabolites (4 h). 6. Ribozymes, aptamers, RNA interference, riboswitches, DNA sequencing, next-generation sequencing (3 h) 7. Synthetic expansion of genetic code. Chemical and chemo-enzymatic labeling of nucleic acids and its applications - (3 h) 8. Solid-phase peptide synthesis and its applications, unnatural amino acids and their incorporation, PNAs. (2 h) 9. Protein engineering – protein design principles, directed

	evolution, enzymes from extremophiles. (3 h) 10. Chemical glycomics: Chemical probes to illustrate carbohydrates oligosaccharides functions and applications of oligosaccharides. (2 h). 11. Case studies using chemical biology primary literature which illustrates methods and techniques taught in the course (4 h)
Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-30% Others-30 marks for Quiz and or presentation%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1. Biochemistry, Voet and Voet, 3rd edition. 2. Principles of Biochemistry, Lehninger, 4th edition. 3. Nucleic Acids in Chemistry and Biology, Edt. Michael Blackburn, Michael Gait, David Loakes and David Willaims, 3rd Edition, 2006, RSC Publishing. 4. Chemical Biology: From small molecules to systems biology and drug design. Edt. Stuart L. Schreiber, Tarun Kapoor, Gunter Wess. Volume 2, 2007, Wiley-VCH. 5. Appropriate literature documents and course materials will be provided.