



SIES

College of Arts,
Science &
Commerce (Autonomous)

RISE WITH EDUCATION

NAAC REACCREDITED - 'A' GRADE

**Sion (West), Mumbai – 400022.
(Autonomous)**

Faculty: Science

Program: Bachelor of Science

Program code: SIUSBT

Subject: BIOTECHNOLOGY

Academic Year: 2023 – 2024

F.Y.B.Sc. Biotechnology

**Credit Based Semester and Grading Syllabi as per NEP
2020 approved by Board of Studies in Biotechnology to be
brought into effect from June 2023.**

PREAMBLE:

Biotechnology, broadly defined, includes any technique that uses living organisms, or parts of such organisms, to make or modify products, to improve plants or animals, or to develop microorganisms for specific use. The interdisciplinary nature of biotechnology integrates living systems including animal, plant and microbes and their studies from molecular biology to cell biology, from biochemistry to biophysics, from genetic engineering to stem cell research, from bioinformatics to genomics-proteomics, from environmental biology to biodiversity, from microbiology to bioprocess engineering, from bioremediation to material transformation and so on. Biotechnology is the science of today and tomorrow. It has applications in all major service sectors i.e. health, agriculture, industry, environment etc. Biotechnology as an application science has taken firm footing in many countries, abroad where a number of transgenic crops, genetically modified food and recombinant therapeutic molecules for human and animal health are available in the market. Biotechnology as a science of service to human society is yet to make inroads in India

With the advent of the World Wide Web in the early nineties and its subsequent growth, the latest research trends have become accessible from drawing rooms across the globe. This acted as a positive feedback mechanism in increasing the pace of research in all fields including Chemical Engineering and Biotechnology. This was the motivation for an in-depth analysis of what is actually required for today's technology. It is also important to take advantage of the freely available software to enhance the quality and quantity of material that can be covered in the classroom.

This restructured syllabus is therefore intended to combine the principles of physical, chemical and biological sciences along with developing advanced technology. The undergraduate curriculum is prepared to impart primarily basic knowledge of the respective subject from all possible aspects. In addition, students will be trained to apply this knowledge particularly in day-to-day applications of biotechnology and hence get a flavor of research.

SEMESTER I

Course Code	Course Type	Course Title	Credits	Lectures (Hrs.)/ week
SIUBTMJ111	DSC-Major	Basic Biotechnology I	3	3
SIUBTMJP111	DSC-Major	Practical in Basic Biotechnology I	1	2
SIUBTMN111	DSC-Minor	Bioorganic Chemistry I	3	3
SIUBTMNP111	DSC-Minor	Practical in Bioorganic Chemistry I	1	2
SIUBTOE111	OE	Food and Nutrition	4	4
SIUENAE111	AEC	English	2	2
SIUSFVE111	VEC	Environment Studies	2	2
SIUSFIK111	IKS	Indian knowledge system	2	2
SIUBTVS111	VSC	Microbial Techniques	1(Theory) + 1(Practical)	2
SIUBTSE111	SEC	Analytical Skills	1(Theory) + 1(Practical)	2
		Total	22	

SEMESTER II

Course Code	Course Type	Course Title	Credits	Lectures (Hrs.)/ week
SIUBTMJ121	DSC-Major	Basic Biotechnology II	3	3
SIUBTMJP121	DSC-Major	Practical in Basic Biotechnology I	1	2
SIUBTMN121	DSC-Minor	Bioorganic Chemistry-II	3	3
SIUBTMNP121	DSC-Minor	Practical in Bioorganic Chemistry-II	1	2
SIUBTOE121	OE	Introduction to Forensic Science	4	4
SIUENAE121	AEC	Language-English	2	2
SIUSFVE121	VEC	Understanding India	2	2
SIUBTVS121	VSC	Biofertilizers	1(Theory) + 1(Practical)	2
SIUBTSE121	SEC	Tissue Culture	1(Theory) + 1(Practical)	2
	Field projects/ Internships/ Apprenticeship / Community engagement and services	NCC/NSS/ Sports / Cultural	2	2
		Total	22	

Semester I

COURSE CODE	TITLE	CREDITS	LECTURES
OE	Food and Nutrition	4	1 lecture = 1 hour
Course Outcomes	<p>On successful completion of the course, the student will be able to</p> <ul style="list-style-type: none"> Understand the concepts of human nutrition, basic and advanced concepts of complementary nutrition, nutrition for fitness and exercise and food psychology. 		
Unit I	<p>Human nutrition Carbohydrates: Overview of Classification, Functions Carbohydrate recommendations(2L) Glycemic Index and Glycemic Load, Sugar substitutes- Nutritive and non - nutritive sweeteners Synthetic and Natural sweeteners (3L) Fats and Fatty acids: Overview of Classification, Functions RDAs of total dietary fat and fatty acid consumption(2L) Fatty acid ratios, SFA, MUFA & PUFAs in health & disease (2L) Proteins and Amino acids- Overview of Classification, Functions, Essential Amino acid requirements and AA imbalances(3L) Vitamins and minerals: Overview of Classification, Functions(3L)</p>	1	15
Unit II	<p>Complementary Nutrition- Basic and advanced aspects Classification, Health benefits, Mechanism of action, sources & recommendations of Prebiotics, Probiotics and Synbiotics -Types, Sources of prebiotics and probiotics, Health benefits, Regulations (5L) Bioactive Dietary Components, Functional foods, Phytochemicals, Flavonoids, Phytoestrogens (4L) Meal Replacers, - Classification, Health benefits, Mechanism of action, Recommendations & concerns (3L) Functional foods Organic foods Convenience foods (3L)</p>	1	15
Unit III	Nutrition For Exercise & Fitness	1	15

	<p>Definition and domains of fitness-Physical, Mental, Social & Spiritual domains of fitness</p> <p>Components of physical fitness (4L)</p> <p>Health oriented components -cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. (2L)</p> <p>Skill oriented components-agility, balance, coordination, power, reaction time, and speed</p> <p>-Factors influencing Physical fitness - Role of exercise and nutrition in Physical fitness,</p> <p>Psychological Fitness- stress- Causes, consequences & strategies of management (3L)</p> <p>Nutrition and Physical Fitness in sports persons</p> <p>Classification of sports activities (3L),</p> <p>Body Composition of Sports Persons</p> <p>Energy metabolism during Exercise (aerobic and anaerobic) (3L)</p>		
<p>Unit IV</p>	<p>Food Psychology</p> <p>The psychology of food choices and eating behavior-Models of food choice, Influences on food choice(1L)</p> <p>Social and psychological models of food choice- Role of family and peers, Food and Culture, Mood, emotions and food choice,(2L) Food cravings and addiction, Food Rewards (1L)</p> <p>Influences of Media on food choice (1L)</p> <p>Role of stress in choosing foods (1L)</p> <p>Alcohol and tobacco use and abuse (2L)</p> <p>Behavior modification strategies to influence food and nutrition choices in disease conditions- Obesity - Behavioral phenotype in obesity, mindful eating, Diabetes, Allergies (2L)</p> <p>Psychology of the food and nutrition consumer- The psychology of the food shopper (1L) Factors affecting food purchase (1L), Food quality and consumer expectations,(1L)Packaging and labeling based on the psychology of the consumer, Ethnic, religious and economic influences on food choice of the consumer (1L), Consumer perception of processed foods, supplements, organic and genetically modified foods (1LT)</p>	<p>1</p>	<p>15</p>

Semester II

COURSE CODE	TITLE	CREDITS	LECTURES
OE	Introduction to Forensic Science	4	1 lecture = 1 hour
Course Outcomes	On successful completion of the course, the student will understand the basic concepts of forensic science, forensic medicine, medical law and ethics, forensic psychology and acts, and emerging trends in forensic science.		
Unit I	Fundamentals of Forensic Science History, Development and Fundamentals of Forensic Science, Definition and Origin of term " <i>forensis</i> " Nature, need and scope(1L) Principles and laws of forensic science (2L) Domains in Forensic Science divisions- ballistics, voice, audio-video, automobiles engineering (3L) Questioned documents division- (stylistics, linguistics, counterfeit) (3L), Cyber division (1L), Fingerprint division (Prints and other impressions) (2L), Psychology (Criminal profiling, polygraphy, narco analysis, brain mapping) (3L)	1	15
Unit II	Essentials of Forensic Science Crime scene investigation and reconstruction, forensic photography (2L) Forensic medicine: Introduction and forensic medicine and legal procedure (2L) Medical law and ethics(1L) Personal identification (1L) Medico legal autopsy (2L) Thanatology, death, and its causes Stages of death (2L) Instrumentation(2L) Basics of Microscopy, Chromatography - Paper, TLC, HPTLC, GC, HPLC Basic Spectroscopy, UV-Visible spectrophotometer (3L)	1	15
Unit III	Forensic Psychology and Acts Narco-analysis- Theory, procedure, admissibility in court, prospects, merits, and demerits of the technique (3L), Brain Mapping- Theory, procedure, admissibility in court, prospects, merits, and demerits of the technique (4L), Polygraph- Theory, procedure,	1	15

	admissibility in court, prospects, merits, and demerits of the technique(4L). Special Acts: Narcotic Drugs and Psychotropic Substance Act , 1985 IT Act, 2005 Wildlife Protection Act 1972 (4L)		
Unit IV	Emerging Trends in Forensic Science Brain mapping, polygraph, PCR, DNA fingerprinting (3L) Digital Forensics (2L): Computer Crimes- Definition Types of computer crimes Cyber Crimes - Definition, Types of cyber-crimes(3L) Computer security(3L) Online security (2L) Data retrieval (2L)	1	15

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