



Department of Biotechnology

SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

About Us

Department Profile

The Department of Biotechnology was established in the academic year 2003-2004 with B.Sc Biotechnology, Microbiology and Chemistry as a self-funding course. There are two faculty members: Smt. C. Sreelalitha and Mr. V. Harinath Reddy.

As of now, the faculty is adequate and competent to impart and train the students in the core areas of Biotechnology and also enrich the students with a better practical experience handling the latest equipment. The department is also provided with an ICT classroom. Besides a UG course, B.Sc, with Biotechnology, Microbiology and Chemistry combination, the department is also offering a PG course, M.Sc, in Biotechnology.

As good learning is a reflection of better skills of students and effective tutoring in both theory and practical training, the Department has an excellent laboratory with the most modern equipment like laminar air flow, refrigerator centrifuge, electrophoresis chambers, U.V. Spectrophotometer, air conditioned culture room which provide a conducive atmosphere for acquiring better practical knowledge, CDs on molecular biology with animation are displayed in the department for the better understanding of the processes of molecular biology.

The total UG student strength of the department is 80. Around 60% of the students are women, which indicates, the safe atmosphere of the college. Most of the students belong to urban areas and backward sections of the society. The department also involves itself in taking classes for I year B. Sc MPC, MPS and BBM students to teach Applications in Biotechnology under SDC. The department frames its own syllabi in the Board of Studies (BOS) under the guidance of outside experts and gets the same ratified in the Academic Council as the institution is autonomous.

The department toils not only for the academic progress of the students but also for their overall development. The pass percentage of the students has been above 90% on an average. The progression of the students has also been excellent. The percentage of students who reach the universities is around 80% and those who reach the level of M. Phil., or Ph.D., are around 10%. This is all because of the semester system and also the hard work of the teachers which enable the students to be thorough with the prescribed syllabi and prepare well

for internal tests and semester-end examinations. The department also constantly monitors the progress of the students by getting feedback from them with regard to the curriculum teaching-learning-evaluation. Apart from the regular classroom teaching, use of computers and OHPs, encouraging the students to participate in group discussions, panel discussions and seminars along with teachers, are the healthy practices of the department. The students are advised to prepare charts or models. Simple science projects are assigned to students to improve their scientific temper. The faculty regularly conducts seminars, guest lectures, group discussions, quiz programmes etc. New teaching methods are an integral part of the department. Remedial classes are conducted for the slow-learners identified by the faculty.

The students express satisfaction with regard to the syllabi, methods of teaching and evaluation. Besides, the faculty and the students participate in extension activities such as clean and green programmes, blood donation camps, plantation, awareness programmes regarding superstitions and diseases. Some students of the department are actively engaged in NSS and NCC programmes.

The alumni of the department have been serving in various state, central government and private organizations in such cadres as administrators, lecturers, teachers, scientists and so on. They often come to the college and meet the present students and share their views with them with regard to the subject and institution. They express happiness about the performance of the department. The Management expresses its happiness about its progress when it visits the department.

The department uses innovative methods of teaching with creativity. The department can boast of its well-equipped laboratories, good student progression and the supporting management. There are opportunities for the department to expose students to hand on experiments, guest lectures and interaction with eminent teachers from various colleges. The department has plans to strengthen the departments by getting further equipment for the PG course. It is also planning to conduct certificate courses in molecular and Genetic Engineering Techniques.





Department of Biotechnology
SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

Faculty

Smt. C. Sreelalitha, Assistant Professor and Head, who has 10 years of teaching experience. She has participated in various seminars/workshops and presented papers. She has also published an article in a national journal. She is specialized in teaching Genetic Engineering and Industrial Biotechnology.



CURRICULAM VITAE

C.Sreelalitha
14/248, Kamalanagar
Anantapuramu-515001

Email: sreelalithac@gmail.com
Mobile no: 7989642122

Designation : Lecturer in Biotechnology
SSBN Degree & PG College
Anantapuramu

ACADEMIC PROFILE:

2004	Bachelor of Science (Biotechnology)	Distinction (83%)	Govt Arts College ATP
2006	Master of Science (Biotechnology)	Distinction (71.06%)	S.K.University , ATP
	Project in M.S.c – IMPLANTA TECHNIQUE GKVK, Bangalore		

Computer Proficiency : P.G.D.C.A

WORKSHOPS/CONFERENCES

1. Participated in National Symposium on recent trends in plant sciences, SKU, ATP 2004
2. Participated in National Seminar on Recent trends in Biotechnology, SSBN Degree College ATP 2006
3. Participated in National Seminar on Challenges in Life Sciences in recent era, SSBN Degree College, ATP 2006
4. Participated in one day training programme on recent techniques in molecular biotechnology organized b Agri biotech foundation(ABF), ANGRAU a Agriculture Research Campus, Reddipalli. 2017



Mr. V. Harinath Reddy, another Assistant Professor and a senior faculty with 5 years of teaching experience. He has participated in various seminars/workshops and presented papers. He has also published an article in a national journal. He is specialized in teaching Biochemistry and Plant Biotechnology.

Technical Support/ Non-teaching Staff



Smt S. Akthar Bee
Attender



Department of Biotechnology
SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

Student Zone

➤ **Syllabus**

B.Sc. BIOTECHNOLOGY COURSE STRUCTURE UNDER CBCS

<i>Year</i>	<i>Semester</i>	<i>Course</i>	<i>Title of the Course</i>	<i>Marks</i>	<i>No. of Hrs /Week</i>	<i>No. of Credits</i>
I	I	I	Biomolecules & Molecular Biology	100	4	03
			Lab Course- I	50	2	02
	II	II	Fundamentals of microbiology, biochemistry & Analytical techniques	100	4	03
			Lab Course – II	50	2	02
II	III	III	Immunology & r-DNA Technology	100	4	03
			Lab Course – III	50	2	02
	IV	IV	Plant & Animal Biotechnology	100	4	03
			Lab – IV	50	2	02
		V	Environmental & Industrial Biotechnology	100	4	03
			Lab Course –V	50	2	02
Total No. of Courses : 05 (Five)						



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU

B.Sc. BIOTECHNOLOGY SYLLABUS UNDER CBCS

[2020-21 Batch onwards]

I Year B.Sc.- Biotechnology: I Semester

PAPER I: BIOMOLECULES & MOLECULAR BIOLOGY

Work load: 60 hrs per semester]

[4 hrs/week

UNIT – 1 Carbohydrates, Aminoacids & Proteins

No. of hours- 12

Carbohydrates : Classification & nomenclature of Carbohydrates.

Monosaccharides : structure & functions of Monosaccharides ex., Glucose, Fructose

Disaccharides : Sucrose, Lactose

Homopolysaccharides : Starch, Glycogen

Heteropolysaccharides : Chondroitin

Aminoacids : classification, structure and properties.

Proteins : Peptides, peptide bond , structure (primary, secondary, tertiary, quaternary) and functions of Proteins.

UNIT – 2 Nucleic acid & Lipids

No. of hours- 10

Structure of DNA - Nitrogenous bases, Nucleosides, Nucleotides, Chargaff's rules, Watson & Crick model of DNA. Forms of DNA – A-form, B-form, Z-form.

Structure of RNA – Forms of RNA- m-RNA, r-RNA, t-RNA

Lipids : classification and structure of Fatty acids (saturated & unsaturated).

UNIT– 3 Enzymology

No. of hours- 10

Terminology – Active site, Allosteric site, Holoenzyme, Apoenzyme, Co-enzyme, Substrate, Inhibitors, Activators, Modulators. Nomenclature & classification of Enzymes, Lock & key, Induced fit model. Factors influencing enzymatic reaction – PH, Temperature, substrate conc. & enzyme conc. Enzyme inhibition – Reversible enzyme inhibition & types – competitive, non-competitive & un- competitive.

UNIT– 4 DNA Replication, damage & Repair

No of hours – 13

DNA as Genetic material- Griffiths experiment, Avery, MacLeod & McCarty's experiment, Hershey & Chase experiment, RNA as genetic material – Reconstitution experiment

DNA Replication – Models – Conservative, dispersive & semiconservative, Rolling circle replication. Meselson & Stahl's experiment, enzymes in replication – DNA polymerases, helicases, topoisomerases, SSB proteins, Primases and ligases. Mechanism of replication in prokaryotes.

DNA damage, DNA repair – direct repair, base excision, nucleotide excision, recombinational & SOS repair mechanisms.

UNIT– 5 Central dogma of Molecular biology

No of hours - 15

Genome organization in prokaryotes and eukaryotes

Transcription – promoters, RNA polymerases, mechanism of transcription in prokaryotes.

Translation – Genetic code, properties of genetic code, wobble hypothesis, mechanism of protein synthesis in prokaryotes.

Regulation of gene expression – Induction & repression, positive & negative regulation, operon concept , lac operon

Credits 2

Lab Course – I

BIOMOLECULES & MOLECULAR BIOLOGY

1. Introduction to basic instruments.
2. Calculation of Molarity & Normality
3. Qualitative analysis of Sugars (Glucose, Fructose, Lactose, Sucrose, Starch)
4. Qualitative analysis of Amino acids (Tyrosine, Tryptophan, Cystene, Arginine)
5. Estimation of DNA by Diphenyl amine method
6. Estimation of RNA by Orcinol method
7. Absorbtion spectra of Nucleic acids
8. Thermal denaturation of DNA



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU

B.Sc. BIOTECHNOLOGY SYLLABUS UNDER CBCS

[2020-21 Batch onwards]

I Year B.Sc.- Biotechnology: II Semester

PAPER II: FUNDAMENTALS OF MICROBIOLOGY, BIOCHEMISTRY & ANALYTICAL TECHNIQUES

Work load: 60 hrs per semester]

[4 hrs/week

UNIT – 1 Introduction to Microbiology

No of hours - 8

Abiogenesis and Biogenesis

History and contributions of Leewenhoek, Louis Pasteur, Robert Koch and Alexander Flemming
Edward Jenner.

UNIT– 2 Microbial taxonomy & Techniques

No of hours – 17

Outlines of classification of Microorganisms – Haeckels three kingdom concept, Whittakers five kingdom concept, Three domain system of Carl Lousé.

Ultra structure of Bacteria isolation, identification & preservation of Bacteria, Growth curve of Bacteria, pure cultures & cultural characteristics.

General characters of viruses – Plant virus (TMV), Animal virus (HIV), Bacterial virus (T 4 Bacteriophage).

Sterilization techniques – principle and applications of physical methods , Heat(Autoclave, Hot air oven), Radiation (Ionizing & Non Ionizing), Filtrations and chemical methods(phenols,alcohols,halogens,salts of Heavy metals & Fumigating agents.

Pure culture techniques – Isolation & Preservation of Bacteria

UNIT– 3 Analytical techniques

No of hours – 15

Chromatography – principles & Application of paper, thinlayer, affinity and gel permeation chromatography.

Centrifugation – basic principle, concept of RCF, differential and density gradient centrifugation

Electrophoresis – Migration of ions in electric field, factors affecting electrophoretic mobility,

Gel electrophoresis- principles and applications of Agarose & SDS – PAGE.

UNIT– 4 Microscopy & spectroscopy

No of hours - 10

Introduction to Microscopy, Principles and applications of Bright field & Electron microscope (TEM,SEM)

Calorimetry - Beer- Lamberts law.

Spectrophotometry- principles and applications of UV & Visible spectrophotometry.

UNIT – 5 Bioenergetics

No of hours – 10

Introduction to Bioenergetics, Freeenergy, entropy , enthalpy & redox potential.

High energy compounds – ATP, Glycolysis, TCA cycle, Electron transport and oxidative phosphorylation.

Lab Course – II

Fundamentals of microbiology, biochemistry & Analytical techniques

1. Preparation of Nutrient broth
2. Preparation of L.B. agar media
3. Isolation of Bacteria from soil
4. Simple staining technique
5. Gram staining technique
6. Separation of Aminoacids by Paper Chromatography
7. Enzyme assay – Catalase or Invertase
8. Agarose gel electrophoresis



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU

B.Sc. BIOTECHNOLOGY SYLLABUS UNDER CBCS

[2021-22 Batch onwards]

I Year B.Sc.- Biotechnology: III Semester

PAPER III: IMMUNOLOGY & r-DNA TECHNOLOGY

Work load: 60 hrs per semester]

[4 hrs/week

UNIT – 1 Cells & organs of Immune system

No. of hours- 12

Terminology: Antigen, Antibody, Hapten, Antigen city, Immunogenicity & types of Immunity (Humoral & cell mediated). Innate & Adaptive Immunity. Haematopoiesis, organs (primary & secondary), tissues, cells (Lymphocytes & cytokines). Introduction to complement components and MHC.

UNIT – 2 Vaccinology & clinical Immunology

No. of hours- 10

Live, Killed, Attenuated, and Subunit & Recombinant vaccines. Role & properties of Adjuvant. Hybridoma technology-production of monoclonal antibodies and their applications. Antigen-antibody interactions- precipitation, agglutination, Immuno diffusion & ELISA. Introduction to Hypersensitivity and types. Autoimmunity and types

UNIT– 3 Tools & techniques of r-DNA technology

No. of hours- 15

Introduction to r-DNA technology, steps involved in cloning, Cloning vectors-plasmids, bacteriophages and cosmids. Restriction endonucleases and Ligases. Principles and applications of PCR, Southern, Northern and Western Blotting. DNA Sangers sequencing method.

UNIT– 4 Cloning strategies and applications of r-DNA technology **No of hours – 13**

c-DNA Library, construction, methods of Transformation selection & screening methods. Applications of r-DNA technology in agriculture-transgenic plants, edible vaccines and antibodies, medicine- DNA fingerprinting

UNIT– 5 Bioinformatics

No of hours – 10

Introduction to Bioinformatics, Nucleotide and protein Databases (pub med, NCBI, EMBL). . Sequence analysis- concepts of sequence analysis and their importance – BLAST and FASTA. Clustal W & phylogenetic tree construction. Introduction to omics (Genomics, proteomics & Transcriptomics). Introduction to Nanotechnology.

Lab Course – III

Immunology & r-DNA technology

1. Determination of Blood grouping
2. Radial Immunodiffusion
3. WIDAL test
4. VDRL test
5. ELISA
6. Pregnancy test
7. Lymphoidal organs
8. Isolation of DNA
9. Isolation of RNA
10. Isolation of Plasmid DNA
11. Agarose gel Electrophoresis
12. Southern blotting
13. PCR Amplification



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU

B.Sc. BIOTECHNOLOGY SYLLABUS UNDER CBCS

[2021-22 Batch onwards]

I Year B.Sc.- Biotechnology: IV Semester

PAPER IV: PLANT & ANIMAL BIOTECHNOLOGY

Work load: 60 hrs per semester]

[4 hrs/week

UNIT – 1 Plant tissue culture techniques

No of hours - 17

Plant tissue culture: Totipotency, media preparation, sterilization techniques, establishment of cultures : callus culture, cell suspension culture. Applications of tissue culture- Micropropagation, somatic embryogenesis, Synthetic seeds production, protoplast culture & Somatic hybridization. Cryopreservation, Plant secondary metabolites – concept and importance

UNIT– 2 Transgenesis and Molecular markers

No of hours – 8

Plant transformation technology- Agrobacterium mediated Gene transfer (Ti plasmid), Hairy root features of Ri plasmid, Transgenic plants as Bioreactors. Herbicide resistance- Glyphosphate, Insect resistance-Bt cotton. Molecular markers- RFLP,RAPD.

UNIT– 3 Animal tissue culture techniques

No of hours – 15

Animal cell culture- cell culture media, Reagents, culture of mammalian cells, tissues & organs, primary culture, secondary culture, cell lines, stem cell cultures, cell viability and cytotoxicity, cryopreservation. Transfection methods- calcium phosphate precipitation,electroporation,microinjection.

UNIT– 4 Transgenic animals & Genetherapy

No of hours – 10

Production of vaccines, Insulin, somatostatin, IVF. Concept of Gene therapy. Transgenic animals- merits & demerits, ethical issues in Animal biotechnology.

UNIT – 5 Bioethics, Biosafety & IPR

No of hours – 10

Bioethics in cloning & stem cell research, Human & Animal experimentation, animal rights & welfare. Biosafety – introduction to biological safety cabinets, primary containment for biohazards, biosafety levels, GLP,GMP, Introduction to IP typesof IP – patents,trademarks & copyrights.

Lab Course – IV

Plant & Animal Biotechnology

1. Plant tissue culture media preparation
2. Callus induction
3. Root Induction
4. Shoot Induction
5. Sterilization & Inoculation
6. Surface sterilization of explants
7. Raising of Aseptic seedlings
8. Preparation of Animal tissue culture media
9. Cell count by Haemocytometer
10. Estimation of cell viability by Dye exclusion method



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU
B.Sc. BIOTECHNOLOGY SYLLABUS UNDER CBCS

[2021-22 Batch onwards]

I Year B.Sc.- Biotechnology: IV Semester

PAPER V: ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY

Work load: 60 hrs per semester]

[4 hrs/week

UNIT – 1 Pollution types & control

No of hours - 17

Environmental biotechnology- types of pollution, air pollution and its control. Biofilters, Bioscrubbers, Biotrickling filters. Water pollution, measurement & sources of water pollution. Waste water treatment- aerobic processes, activated sludge, oxidation ponds, trickling filters and rotating biological contactors. Anaerobic processes – Anaerobic digestors, upward flow anaerobic sludge blanket reactors

UNIT– 2 Bioremediation

No of hours –10

Biodegradation & Bioremediation- concepts & principles, Bioremediation of Hydrocarbons and its applications. Degradation of pesticides by microorganisms. Role of genetically engineered microbes, concept of Phytoremediation environmental safety guidelines.

UNIT– 3 Biofuels

No of hours – 8

Biofuels- Biogas production, microbial groups involved in Biogas production and interactions, factors affecting biogas production. Biofertilizers.

UNIT– 4 Basic principles of Microbial technology

No of hours – 10

Industrially important microbes, screening, selection & identification. Maintenance & preservation of microorganisms and cultures. Strain improvement, basic concepts of fermentation, design of fermentor and applications

UNIT – 5 Commercial production of microbial products

No of hours – 15

Microbial production of organic acids- lactic & citric acid, Aminoacids – Glutamic, aspartic and lysine, Dairy products- cheese, yoghurt, Beverages – beer, wine, Antibiotics – Streptomycin, penicillin

Lab Course – V

Environmental & Industrial Biotechnology

1. Microscopic observation of Industrially important Microorganisms
2. Peoduction of Ethanol by fermentation
3. Estimation of Alcohol by calorimetry
4. Production of Citricacid by fermentation
5. Estimation of citricacid
6. Detection of coliforms for determination of the purity of potable water
7. Determination of dissolved oxygen concentration in water sample
8. Determination of BOD
9. IMVIC test
10. MBRT method



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU

Skill Development Course (SDC)

OFFERED BY DEPARTMENT OF BIOTECHNOLOGY

[2021-22 Batch onwards]

I Semester

FUNDAMENTALS OF BIOTECHNOLOGY

Total 30 hrs (02h/wk)]

[02 Credits & Max Marks: 50

Unit 1:

Introduction to Biotechnology, definition, old and new Biotechnology, scope and importance.
Historical developments in Biotechnology, Current uses of Biotechnology.
Different branches of Biotechnology.

Unit II:

Organization of genome in Prokaryotes(E.coli) and Eukaryotes(Human cell).
Gena and Gene number in different species
Organization of Eukaryotic genes – Exons, Introns, Promoters and Terminators
Gene families and clusters

Unit III:

Consumer concerns about Biotechnology – Food issues, governing of Biotechnology.
Ethical issues of Biotechnology – Patents on life, Biopiracy.
Biotechnology research in India.



S S B N DEGREE COLLEGE (AUTONOMOUS):: ANANTAPURAMU

Skill Development Course (SDC)

OFFERED BY DEPARTMENT OF BIOTECHNOLOGY

[2021-22 Batch onwards]

III Semester

BIOTECHNOLOGY-HEALTH CARE

Total 30 hrs (02h/wk)]

[02 Credits & Max Marks: 50

UNIT I

Molecular diagnosis – Monoclonal antibodies, DNA probes, Microarrays, DNA fingerprinting.
Gene therapy, Recombinant therapeutic proteins – Insulin, Interferon, Growth hormone.
Stem cells and Regenerative medicine

Unit II:

Transgenic animals – Transgenic mice & Transgenic fish.
Transgenic plants – Preservation of fruits, altered flower colours ,
Male sterility, Photosynthetic efficiency

Unit III:

Bioremediation – Genetically engineered Bacteria for Bioremediation.
Biofertilizers, Biopesticides, Biological pest control.



Department of Biotechnology
SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

Course Outcomes

Aim and objectives of B.Sc Biotechnology:

The Biotechnology degree program provides students with robust science concepts and an application-oriented undergraduate education. The program is aimed to prepare students for employment opportunities in the biotechnology industry. In addition, students gain the in-depth knowledge and core set of skills that span across basic sciences, technology. This is an unique program in the State of Andhra Pradesh to integrate plant, animal, medical and environmental biotechnology into an undergraduate curriculum.

Learning outcomes of Subject:

The courses are strongly interdisciplinary in nature and they will give an insight into basic aspects of microbiology, immunology, molecular biology, biochemical, biophysical aspects and different application in medical, industrial biotechnology and environmental biotechnology.



Department of Biotechnology
SRI SAI BABA NATIONAL DEGREE COLLEGE :: ANANTAPUR

➤ **Beyond Syllabus**

Recommended Co-Curricular Activities:

Measurable

- Assignments (in writing and doing forms on the aspects of outside the syllabus content. *(Shall be individual and challenging)*)
- Student seminars (on topics of the syllabus and related aspects. *(Individual activity)*)
- Quiz (on topics where the content can be compiled by smaller aspects and data *(Individuals or groups as teams)*)
- Field studies (individual observations and recordings as per syllabus content and related areas *(Individual or team activity)*)
- Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured *(team activity)*)

General

- ❖ Group Discussion
- ❖ Visit to Research Stations, Science Museum Centres to understand the basic principles of mechanics with live examples and related industries
- ❖ Visit to Satellite launching station at **ELITE BIOTECHNOLOGIES, GONDIREDDI PALLI (V), RAPTADU (M), ANANTAPURAMU (D).**
