



FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Food Processing Technology)

Semester: VII

Course Code: 202070707

Course Title: Food Biotechnology

Course Group: Professional Elective Course - IV

Course Objectives: The interdisciplinary and research-oriented subject Food Biotechnology is concerned with the properties, the production processes and the manifold applications of enzymes and microorganisms in the food industry, in its supplying industries and for analytical or processing aid purposes.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50/18	50/17	25/9	25/9	150/53

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to biotechnology: Concepts, history, DNA replication, transcription, translation. Post translational modification, expression systems	06
2	Recombinant DNA technology: Vectors (cloning and expression), DNA libraries, isolation & electrophoresis of DNA, DNA hybridization and Southern blotting. DNA fingerprinting, DNA sequencing, PCR, Gene manipulation through: Transformation, jumping genes, Mutation (types and methodology), auxotrophs, restriction enzymes	07
3	Genetically modified organisms and food: Concept & dilemma, examples (golden rice, BT brinjal, FlavrSavr™ tomato), Cloning, transgenic animals and plants, detection, risk associated.	07
4	Biosensors: Design and Components, Biosensors for food contaminant analysis, Commercially available biosensors for food analysis. Super foods, enhancing the nutritional quality and shelf life of foods. Bioremediation, food effluent treatment, food waste utilization	09



5	Biopeptides (Bacteriocins): Introduction, Classification, Mode of action, Bioengineering of bacteriocins, Commercial production, Applications, Biopeptide resistance and bioavailability, Therapeutic use	09
6	Ethics related to Food Biotechnology: Legal framework for the production of genetically modified organisms and foodstuff (national / European). Ethical issues of Food Biotechnology.	07
	Total	45

List of Practicals / Tutorials:

1	To perform extraction of DNA from microbial cells
2	To quantify the DNA spectrophotometrically
3	To perform agarose gel electrophoresis
4	Demonstration of Polymerase chain reaction
5	Isolation of mutant/ auxotroph by replica plating method
6	To modify the given DNA by restriction endonucleases
7	To perform SDS-PAGE for the given protein
8	To evaluate the antimicrobial effect of bacteriocin
9	Strain improvement for production of given metabolite/ enzyme
10	Transformation of competent <i>E.coli</i>
11	Expression of chymosin

Reference Books:

1	Fundamentals of Food Biotechnology by Lee B.H. Publisher Willey Blackwell
2	Food Biotechnology 2 nd Edition by Pometto A., Shetty K., Paliyath G., Levin R. Publisher Taylor & Francis
3	Food Biotechnology by Foster G.N. Publisher: CBS Publishers
4	Brown TA. (2006). Gene Cloning and DNA Analysis. 5th edition. Blackwell Publishing, Oxford, U.K.
5	Glick BR and Pasternak JJ. (2003). Molecular Biotechnology. 3rd edition. ASM Press Washington D.C.
6	Sambrook J, Fritsch EF and Maniatis T. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press.

Supplementary learning Material:

1	Amare BihonAsfaw&Ayalew Assefa- 2019, Animal transgenesis technology: A review, Cogent Food & Agriculture, 5:1, DOI: 10.1080/23311932.2019.1686802
2	Biotechnology, Genetic Engineering, and "GMOs:" Why all the Controversy? https://www.ift.org/career-development/learn-about-food-science/food-facts/food-facts-emerging-science-and-technologies/biotechnology-genetic-engineering-gmos
3	Eckerstorfer, M. F., Engelhard, M., Heissenberger, A., Simon, S., &Teichmann, H. (2019). Plants Developed by New Genetic Modification Techniques-Comparison of Existing Regulatory Frameworks in the EU and Non-EU Countries. Frontiers in bioengineering and biotechnology, 7, 26. https://doi.org/10.3389/fbioe.2019.00026



Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits
- Course Projects

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
15%	30%	20%	25%	5%	5%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Conceptualize the concept and fundamentals of biotechnology with respect to Food processing arena. Understand significance of the emerging biotechnology in the food processing;	25
CO-2	Understand Genetic engineering in the production of food crops and other GM foods	10
CO-3	Comprehend the application of biotechnology in the development and application of biosensor	25
CO-4	Comprehend the application of biotechnology in the production of bio peptide and its uses	25
CO-5	Understand the pros and cons of traditional and modern biotechnology; ethical issues and the future view of biotechnology;	15

Curriculum Revision:

Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2025