



(Master of Science - Home Science) (Food Biotechnology)
(M.Sc. - H.Sc.) (Food Biotechnology) Semester (II)

Course Code	PH02CFBT52	Title of the Course	Recombinant DNA Technology
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none">1. To understand the gene cloning methods and the tools and techniques involved in gene cloning and genome analysis and genomics2. To explain the heterologous expression of cloned genes in different hosts, production of recombinant proteins and PCR techniques3. To explain comparative genomics and proteomics
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Course Content		
Unit	Description	Weightage (%)
1.	<ol style="list-style-type: none">(a) Concept and emergence of r-DNA technology(b) Generation and cloning of DNA fragment(c) Restriction and modification, and enzymes used in r-DNA technology, c-DNA preparation, Oligonucleotide synthesis, Modification of DNA extremities	20
2.	<p>Cloning Vectors:</p> <ol style="list-style-type: none">(a) Plasmids from <i>Escherchia Coli and other microorganisms (B. Subtilis Psuedomonas, Yeast)</i>, Mu, M-13 and other animal and plant viral vectors. Specialized vectors (expression, translation vectors etc.) Invitro packaging, Ligation to vector molecules(b) Transformation and transfection in bacteria, yeast, fungi, other eukaryotic systems(c) Creation and screening library (Recombinant selection)(d) Expression of a cloned DNA	20
3.	<p>Characterization of cloned DNA</p> <ol style="list-style-type: none">(a) Sequencing of DNA, Gene expression from strong and regulatable promoters(b) Fusion protein increasing protein stability(c) <i>In vitro</i> mutagenesis, transporon mutagenesis(d) Heterologous protein production in eukaryotic cells(e) Maximizing expression of foreign DNA	20





4.	<p>(a) Principle of agarose gel electrophoresis, radiolabeling of DNA / RNA, Southern hybridization, Northern and Western blot, Colony and plaque hybridization immune chemical detection, hybrid released and hybrid arrested translation</p> <p>(b) Sequencing and amplification of DNA: Nested PCR, AFLP-PCR, Real-time PCR/qpcr , SYBR green assay, Taqman assay, Site directed mutagenesis</p> <p>(c) Current status of genome sequencing projects: Introduction to Functional genomics, Microarrays, Serial Analysis of Gene expression (SAGE), Subtractive hybridization, DIGE, TOGA, Yeast Two hybrid Systems, Proteogenomics, Applications of genome analysis and genomics</p>	20
5.	<p>Application of r DNA Technology</p> <p>(a) Applications of genetic engineering in improvement of plants, animals and microbes; Gene therapy, pharmaceutical products and molecular diagnostics; Marker Assisted Selection; Restriction and regulation for the release of gmos</p> <p>(b) Commercial products (Insulin, growth hormones etc.)</p>	20

Teaching-Learning Methodology	Classroom lectures (Blackboard/Power Point Presentations), Discussion on recent updates with related examples
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will become aware of	
1.	Cloning technology of genes.
2.	Commercially important recombinant proteins.
3.	Gene and genome sequencing techniques.
4.	Microarrays, analysis of gene expression and proteomics.





Suggested References:

Sr. No.	References
1.	Primrose, S.B., Twyman, R. M. and Old, R.W. (2001). <i>Principles of gene manipulation</i> . (6th Edition). Wiley–Blackwell.
2.	Brown, T.A. (2016). <i>Gene Cloning and DNA Analysis</i> . (7th edition). Wiley-Blackwell.
3.	Glick, B.R. and Pasternak, J.J. (2010). <i>Molecular Biotechnology: Principles and Applications of Recombinant DNA</i> . (4 th Edition). ASM.
4.	Primrose, S.B. and Twyman, R. M. (2006). <i>Principles Of Gene Manipulation & Geneomics</i> . Blackwell Science Publications.

On-line resources to be used if available as reference material

<https://epgp.inflibnet.ac.in/>

<https://www.britannica.com/science/recombinant-DNA-technology>

<https://www.globalresearchonline.net/volume1issue1/Article%200004.pdf>

<https://ncert.nic.in/ncerts/l/lebo111.pdf>





SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25))
Syllabus with effect from the Academic Year 2021-2022

