

Koneru Lakshmaiah Education Foundation (Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

Accredited by NAAC as 'A' Grade University ❖Approved by AICTE ❖ ISO 9001-2015 Certified Campus: Green Fields, Vaddeswaram - 522 502, Guntur District, Andhra Pradesh, INDIA. Phone No. 0863 - 2399999; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in

Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 -2577715, Fax: +91-866-2577717.

DEPARTMENT OF BIOTECHNOLOG M.TECH-BIOTECHNOLOGY ACADEMIC YEAR: 2018-2019

S.NO.	Couse code	Course Title	CO NO.	Description of the Course Outcome
			CO1	Estimate the degree of linear and non-linear relationship between the variables and drawing conclusions
1	18BT5101	Mathematics and	CO2	Interpret and communicate the outcomes in the context of a problem by Designs of Experiment in the context of parametric and non parametric approach
	finding techniques	Finding roots for transcendental and algebraic equation in terms of Biology by root finding techniques		
			CO4	Solving first order differential equations in real time data
2		Biochemical Engineering	CO1	To understand the basic concept of biochemical engineering and understand various reactions
	18BT5102		CO2	Understand and specify reactors used in industrial bioprocesses, develop mathematical models for bioreactors and analyze their behavior (dynamic and steady state).
			CO3	Understand basic principles of mass transfer phenomenon in bioprocessing, and its importance and application in aerobic systems
			CO4	Understand various reactor systems and its used in biochemical engineering
Si .			CO5	To learn the application of biochemical engineering while solving the real-time problems

partment of Biotechnology Department of Biotechnology, Lakshmaiah Education Foundal, (Deemed to the University)

(Deemed to the University)

VADDESWARAM, Guntin Dt.

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			CO1	Understand DNA Structure & Replication and Transcription And Translation
		с	C02	Understand the Regulation of Gene Expression
3	18BT5103	Molecular Biology and r- DNA Technology	CO3	Acquire knowledge of Enzymes and Vectors In Cloning
2	ħ		C04	Acquire knowledge of PCR, Sequencing & RNA Technologies, biological models and transgenic
			CO5	Apply the knowledge of Molecular Biology & rDNA Technology methods
-	-		CO1	Acquire the theoretical basis of applied bioinformatics and understand the access and retrieval of biological information from databases.
		wi wi	CO2	Explain the proteomic and metabolomic approaches at current trends
4	18BT5104	Applied Bioinformatics	CO3	Develop gene expression profiling to understand expression in both prokaryotes and eukaryotes databases.
		*	CO4	Demonstrate the systems biology tools using retrieved complex data from
	,		CO5	Choose the gene sequences, structures of molecules and metabolomic data from the databases.
			CO1	Understand the basics of plant tissue culture, protoplast culture and somatic hybrids
	5		CO2	Apply the Plant Tissue culture to Genetic engineering and development of transgenic plants
5	18BT5105	Plant and Animal Biotechnology	CO3	Understand the basics and importance of animal tissue culture
			CO4	Apply the Transgenic technology to Animals and applications of transgenic animal technology
		*	CO5	Compare in vitro cultured plants, cells and metabolites

Department of Biotechnology
Lakshmaiah Education Foundation
(Deemed to be University)
VADDESWARAM, Guntur Dt.

			CO1	Acquire the knowledge about immune systems
	-	-	CO2	Understand the concepts of immunological responses
. 6	18BT5106	Immunotechnolo gy	CO3	Understand immunity with respect to disorders and infection
	я		CO4	Understand the technological advances in immunology
			CO5	Conduct various immunological assays and apply them to diagnostics
		8	CO1	Understand the Fundamentals of Modeling and apply their principles in bioprocess.
7	18BT5107	Bioreactor Modelling and	CO2	Understand the Enzymes and growth kinetic models and Ability to apply their principles in bioprocess.
	10010107	Simulation	CO3	Understand batch and product formation kinetic models and ability to apply their principles in bioprocess.
ц	n n	s 8	CO4	Understand principles of biological systems and apply simulation principles for better biomass and product formation.
			CO1	Acquire the knowledge of primary separation and recovery processes
	= =	-	CO2	Apply the principles of solid removal unit operations and product enrichment operations
8	18BT5108	Downstream Processing	CO3	Apply the principles of aqueous two-phase extraction process and productpurification methods
	si Si W	-	CO4	Analyze the methods of alternative separation, product polishing and formulations
		= = * v	CO5	Evaluate the bioseparation methods for recovery, isolation and purification of various bioproducts

Department of Biotechnology

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9	18BT51A1	Protein Engineering	CO2	Students will explore the diverse applications of protein engineering in biotechnology and medicine
а		a seem angineering	CO3	Students will gain proficiency in protein design and engineering techniques used to modify protein structure and function for various applications
		×	CO4	students will develop critical analysis and research skills through hands-on laboratory experiments, literature reviews, and independent research projects.
	» <u>^</u>	- N	C01	students will acquire advanced knowledge of the principles and concepts of food science and technology.
10	18BT51B1	Food Technology	CO2	Students will master techniques for ensuring food quality and safety throughout the food supply chain.
		rood recimiology	CO3	students will develop innovation and product development skills to create novel food products that meet consumer demands and industry trends
		5 8	CO4	Students will examine the environmental, social, and economic aspects of food production and consumption, with a focus on sustainability and environmental impact
		*	CO1	Acquire the knowledge of primary separation and recovery processes Oneru La
11	18BT51B2	Transport phenomenon in	CO2	Apply the principles of solid removal unit operations and product enrichment operations
900 APP		bioprocess	CO3	Apply the principles of aqueous two-phase extraction process and product purification methods
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12	18BT51C1	Perl programming and	CO2	Students will gain a solid understanding of bioinformatics concepts and algorithms relevant to molecular biology and genomics
		Bioperl	CO3	Students will become proficient in using Bioperl, a comprehensive toolkit for bioinformatics programming in Perl
		-	CO4	Students will apply their Perl programming and Bioperl skills to real-world research projects in molecular biology and bioinformatics
		, ,	CO1	Remembering the basics of bioreactor operational modes and microbial growth kinetics.
13	18BT51C2	Bioprocess Technology	CO2	Understand the reactor consideration and kinetics of immobilized enzyme systems.
× 1	1921 0102	Dioprocess reciniology	CO3	Understand the concept of mass transfer coefficient and bioreactor scaleup process
	W O	*	CO4	Apply the principles of bioprocess for the design consideration of different recombinant based cultivation systems.
			CO1	Interpret basic knowledge on intellectual property rights and their implications in biological research and product development.
14	18BT52C7	IPR&PATENT LAWS	CO2	Interpret the knowledge of documentation and protocols; case studies on patents and patent drafting.
	10210201	WWW. VIEW I FWAA2	CO3	Develop the knowledge about the biosafety and risk assessment of products derived from biotechnology and regulation of such products.
		0 0 8	CO4	Develop the knowledge about the ethical issues in biological research.

ACADEMICS PROFESSOR INCHARGE

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Head
Department of Biotechnology
Koneru Lakshmaiah Education Founda
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Head

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DEPARTMENT OF BIOTECHNOLOGY M.TECH-BIOTECHNOLOGY

ACADEMIC YEAR: 2019-2020

S.NO.	Couse code	Course Title	CO NO.	Description of the Course Outcome
			CO1	Estimate the degree of linear and non-linear relationship between the variables and drawing conclusions
1 19BT5101	19BT5101	Mathematics and	CO2	Interpret and communicate the outcomes in the context of a problem by Designs of Experiment in the context of parametric and non parametric approach
	, a	Biostatistics	CO3	Finding roots for transcendental and algebraic equation in terms of Biology by root finding techniques
			CO4	Solving first order differential equations in real time data
B 0		-	CO1	To understand the basic concept of biochemical engineering and understand various reactions
			C02	Understand and specify reactors used in industrial bioprocesses, develop mathematical models for bioreactors and analyze their behavior (dynamic and steady state).
2	19BT5102	Biochemical Engineering	CO3	Understand basic principles of mass transfer phenomenon in bioprocessing, and its importance and application in aerobic systems
	, ,		CO4	Understand various reactor systems and its used in biochemical engineering
	n I	a a	CO5	To learn the application of biochemical engineering while solving the real- time problems

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			C01	Understand DNA Structure & Replication and Transcription And Translation
		7	CO2	Understand the Regulation of Gene Expression
3	19BT5103	Molecular Biology and r- DNA Technology	CO3	Acquire knowledge of Enzymes and Vectors In Cloning
		×	CO4	Acquire knowledge of PCR, Sequencing & RNA Technologies, biological models and transgenic
	y ×	e Le H	CO5	Apply the knowledge of Molecular Biology & rDNA Technology methods
			CO1	Acquire the theoretical basis of applied bioinformatics and understand the access and retrieval of biological information from databases.
			CO2	Explain the proteomic and metabolomic approaches at current trends
4	19BT5104	Applied Bioinformatics	CO3	Develop gene expression profiling to understand expression in both prokaryotes and eukaryotes databases.
		n s	CO4	Demonstrate the systems biology tools using retrieved complex data from
		2	CO5	Choose the gene sequences, structures of molecules and metabolomic data from the databases.
			CO1	Understand the basics of plant tissue culture, protoplast culture and somatic hybrids
	2		CO2	Apply the Plant Tissue culture to Genetic engineering and development of transgenic plants
- 5	19BT5105	Plant and Animal Biotechnology	CO3	Understand the basics and importance of animal tissue culture
-154 -154 -15			CO4	Apply the Transgenic technology to Animals and applications of transgenic animal technology
2	- T	-	CO5	Compare in vitro cultured plants, cells and metabolites

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6	19BT5106	Immunotechnolo gy	C03	Understand immunity with respect to disorders and infection
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			CO5	Conduct various immunological assays and apply them to diagnostics
	25 E		CO1	Understand the Fundamentals of Modeling and apply their principles in bioprocess.
7	19BT5107	Bioreactor Modelling and	CO2	Understand the Enzymes and growth kinetic models and Ability to apply their principles in bioprocess.
		Simulation	CO3	Understand batch and product formation kinetic models and ability to apply their principles in bioprocess.
	×		CO4	Understand principles of biological systems and apply simulation principles for better biomass and product formation.
			CO1	Acquire the knowledge of primary separation and recovery processes
			CO2	Apply the principles of solid removal unit operations and product enrichment operations
8	19BT5108	Downstream Processing	CO3	Apply the principles of aqueous two-phase extraction process and productpurification methods
*		a	CO4	Analyze the methods of alternative separation, product polishing and formulations
s o !			C05	Evaluate the bioseparation methods for recovery, isolation and purification of various bioproducts

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9	19BT51A1	Protein Engineering	CO2	Students will explore the diverse applications of protein engineering in biotechnology and medicine
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	5		CO4	students will develop critical analysis and research skills through hands-on laboratory experiments, literature reviews, and independent research projects.
	a	.n	CO1	students will acquire advanced knowledge of the principles and concepts of food science and technology.
10	0 19BT51B1 Food Technology	CO2	Students will master techniques for ensuring food quality and safety throughout the food supply chain.	
		Took Teelmology	CO3	students will develop innovation and product development skills to create novel food products that meet consumer demands and industry trends
4		,	CO4	Students will examine the environmental, social, and economic aspects of food production and consumption, with a focus on sustainability and environmental impact
			CO1	Acquire the knowledge of primary separation and recovery processes
11	19BT51B2	Transport phenomenon in	CO2	Apply the principles of solid removal unit operations and product enrichment operations
		bioprocess	CO3	Apply the principles of aqueous two-phase extraction process and product purification methods
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			C01	Students will develop proficiency in the Perl programming language, including syntax, data structures, control flow, and regular expressions
12	19BT51C1	Perl programming and	CO2	Students will gain a solid understanding of bioinformatics concepts and algorithms relevant to molecular biology and genomics
70.		Bioperl	C03	Students will become proficient in using Bioperl, a comprehensive toolkit for bioinformatics programming in Perl
	·		CO4	Students will apply their Perl programming and Bioperl skills to real-world research projects in molecular biology and bioinformatics
	_	and the second s	CO1	Remembering the basics of bioreactor operational modes and microbial growth kinetics.
13	13 19BT51C2	Bioprocess Technology	CO2	Understand the reactor consideration and kinetics of immobilized enzyme systems.
		July 1 commonly	CO3	Understand the concept of mass transfer coefficient and bioreactor scaleup process
	R		CO4	Apply the principles of bioprocess for the design consideration of different recombinant based cultivation systems.
-			CO1	Interpret basic knowledge on intellectual property rights and their implications in biological research and product development.
14	19BT52C7	7 IPR&PATENT LAWS	CO2	Interpret the knowledge of documentation and protocols; case studies on patents and patent drafting.
			CO3	Develop the knowledge about the biosafety and risk assessment of products derived from biotechnology and regulation of such products.
	S S		CO4	Develop the knowledge about the ethical issues in biological research.

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ACADEMIC YEAR: 2020-2021

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		8 0	CO3	Finding roots for transcendental and algebraic equation in terms of Biology by root finding techniques
	8		CO4	Solving first order differential equations in real time data
	×		CO1	To understand the basic concept of biochemical engineering and understand various reactions
2 20	1		CO2	Understand and specify reactors used in industrial bioprocesses, develop mathematica models for bioreactors and analyze their behavior (dynamic and steady state).
	20BT5102 Biochemical E	Biochemical Engineering	CO3	Understand basic principles of mass transfer phenomenon in bioprocessing, and its importance and application in aerobic systems
		CO4	CO4	Understand various reactor systems and its used in biochemical engineering
	N		CO5	To learn the application of biochemical engineering while solving the real-time problems

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		, -	C01	Understand DNA Structure & Replication and Transcription And Translation
	-	2	CO2	Understand the Regulation of Gene Expression
3	20BT5103	Molecular Biology and r- DNA Technology	CO3	Acquire knowledge of Enzymes and Vectors In Cloning
	Ð %		C04	Acquire knowledge of PCR, Sequencing & RNA Technologies, biological models and transgenic
	_= =	- a*	CO5	Apply the knowledge of Molecular Biology & rDNA Technology methods
-	2		CO1	Acquire the theoretical basis of applied bioinformatics and understand the access and retrieval of biological information from databases.
		5	CO2	Explain the proteomic and metabolomic approaches at current trends
4	20BT5104	Applied Bioinformatics	CO3	Develop gene expression profiling to understand expression in both prokaryotes and eukaryotes databases.
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5	20BT5105	Plant and Animal Biotechnology	CO3	Understand the basics and importance of animal tissue culture
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Department of Biotechnology
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VABBESWARAM, Guntur Bt.

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	0		CO2	Understand the concepts of immunological responses
6.	20BT5106	Immunotechnolo gy	CO3	Understand immunity with respect to disorders and infection
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		.81	CO1	Understand the Fundamentals of Modeling and apply their principles in bioprocess.
7	20BT5107	Bioreactor Modelling and	CO2	Understand the Enzymes and growth kinetic models and Ability to apply their principles in bioprocess.
		Simulation	CO3	Understand batch and product formation kinetic models and ability to apply their principles in bioprocess.
		13 (5)	CO4	Understand principles of biological systems and apply simulation principles for better biomass and product formation.
			CO1	Acquire the knowledge of primary separation and recovery processes
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8	20BT5108	Downstream Processing	CO3	Apply the principles of aqueous two-phase extraction process and productpurification methods
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10	10 20BT51B1 F	Food Technology	CO2	Students will master techniques for ensuring food quality and safety throughout the food supply chain.
×			CO3	students will develop innovation and product development skills to create novel food products that meet consumer demands and industry trends
	D/	3 	CO4	Students will examine the environmental, social, and economic aspects of food production and consumption, with a focus on sustainability and environmental impact
			CO1	Acquire the knowledge of primary separation and recovery processes
11	20BT51B2 Transp	Transport phenomenon in	CO2	Apply the principles of solid removal unit operations and product enrichment operations
71		bioprocess	CO3	Apply the principles of aqueous two-phase extraction process and product purification methods
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11	1 21BT51B2	BT51B2 Transport phenomenon in bioprocess	CO2	Apply the principles of solid removal unit operations and product enrichment operations
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Department of Sietechnology

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		Perl programming and Bioperl	CO1	Students will develop proficiency in the Perl programming language, including syntax, data structures, control flow, and regular expressions
12	21BT51C1		CO2	Students will gain a solid understanding of bioinformatics concepts and algorithms relevant to molecular biology and genomics
70			. CO3	Students will become proficient in using Bioperl, a comprehensive toolkit for bioinformatics programming in Perl
-			CO4	Students will apply their Perl programming and Bioperl skills to real-world research projects in molecular biology and bioinformatics
=		Bioprocess Technology	C01	Remembering the basics of bioreactor operational modes and microbial growth kinetics.
13	21BT51C2		CO2	Understand the reactor consideration and kinetics of immobilized enzyme systems.
	1 1	2 Proprocess recimology	CO3	Understand the concept of mass transfer coefficient and bioreactor scaleup process
			CO4	Apply the principles of bioprocess for the design consideration of different recombinant based cultivation systems.
-	14 21BT52C7 IPR&PATENT LAWS	21BT52C7 IPR&PATENT LAWS	CO1	Interpret basic knowledge on intellectual property rights and their implications in biological research and product development.
14			CO2	Interpret the knowledge of documentation and protocols; case studies on patents and patent drafting.
			CO3	Develop the knowledge about the biosafety and risk assessment of products derived from biotechnology and regulation of such products.
		CO4	Develop the knowledge about the ethical issues in biological research.	

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