



Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s 3 of the UGC Act, 1956)

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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.

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XXXIII ACADEMIC COUNCIL-ANNEXURE 2.7

Date: 19/05/2021

DEPARTMENT OF BIOTECHNOLOGY

MINUTES OF XXIX BOARD OF STUDIES MEETING

The Department Board of Studies meeting was conducted on 19/05/2021 in offline mode from 10:00 am to 12:30 pm Dr. K Giridhar, HoD-BT, as a chair.

The following members were present for XXIX BoS meeting

1. Dr.K Giridhar, Assoc. Professor, HoD-BT, Chairman
2. Dr.K Sridhar, Professor, Osmania University -External Member
3. Dr.Ratna Sudha, Sr.Scientist, Unique Biotech-Hyderabad -External Member
4. Mrs.Sarada Gandhi, Senior Bioinformatics Manager, Indushealthplus-Pune-External Member
5. Dr.V.Praveen Kumar, Assoc.Professor, Deputy HoD-Member
6. Dr.K.Shrinivaslu, Professor-Member
7. Dr.Jaya Kumar Singh, Professor-Member
8. Dr.BVLS Prasad, Professor-Member
9. Dr.M.Sudhamani, Assoc.Professor-Member
10. Dr.M.Maheswara Reddy, Asst.Professor-Member
11. Dr.G.Siva Reddy, Asst.Professor-Member
12. Dr.M S R Krishna, Asst.Professor-Member
13. Dr.Nadeem Siddiqui, Asst.Professor-Member
14. Dr.Sarada Prasanna Mallick, Asst.Professor-Member

Member's Absent-NIL

Dr. K Giridhar, Chairman of BoS, started the meeting remarks by welcoming and introducing the external members to the internal and special invite members and thanking them for accepting to become members of the Board of Studies. The chairman put forward the Agenda items before the Board of Studies meeting.

The following items of the agenda were placed for consideration before the Board of Studies in Biotechnology at its present meeting.


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Department of Biotechnology
Koneru Lakshmaiah Education Foundation
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VADESWAREM, Guntur Dt. 20/5/21



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AGENDA and RESOLUTIONS

AGENDA ITEM-I

To consider and approve the curriculum for the 2021-22 admitted batch of B.Tech & M.Tech and the minor changes proposed in the curriculum of the 2020-21 admitted batch of B.Tech as per the suggestions and feedback received from stakeholders discussed in DAC.	Approved and recommended to Academic Council
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RESOLUTION: The curriculum for 2021-22 B.Tech & M.Tech and the minor changes proposed in the curriculum of 2020-21 admitted batches have been approved by BoS members and recommended to Academic Council. Course structure of 2021-22 and 2020-21, batches have been furnished in **(Annexure: I)**.

AGENDA ITEM-II


To consider and approve the revisions proposed by the course coordinators in syllabus / Course Outcomes /experiments/teaching pedagogies for the courses to be offered in the 2021-2022 academic year.	Approved and recommended to Academic Council
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RESOLUTION: The revisions proposed by the stakeholders and course coordinators in syllabus/Course Outcomes /experiments / teaching pedagogies for the courses to be offered in the 2021-2022 admitted batch have been approved by BoS members and recommended to Academic Council. Syllabi of 2021-2022 batches have been furnished in **(Annexure: II)**.

AGENDA ITEM-III

To consider and approve the resolutions made by XXIX DAC conducted on 15 th May 2021.	Approved and recommended to Academic Council
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RESOLUTION: The points discussed in the DAC meeting were approved by BoS members and recommended to Academic council. DAC minutes and proofs are mentioned in **(Annexure: III)**.


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AGENDA ITEM-IV

To approve the feedback from stakeholders regarding the 2021-22 batch of admitted students	Approved and recommended to Academic Council
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The following is the feedback given by stakeholders on the curriculum

- ❖ Dr. Ratna Sudha, MD, Unique Biotech Pvt.ltd, Hyderabad, Telangana, NGS Sequencing and Data Analysis course to be floated. Upon discussion, the resolution was passed and recommended to the academic council for approval of the new course (NGS Sequencing and Data Analysis).
- ❖ Dr. Rajesh, Scientist E, Sanofi Biotech, Medchal, Telangana, Biomaterials course to be floated. Upon discussion, the resolution was passed and recommended to the academic council for approval of the new course (Biomaterials).
- ❖ Dr. Alok Kumar, Sanofi Biotech, Medchal, Telangana, Computer-aided drug design course to be floated. Upon discussion, the resolution was passed and recommended to academic council for approval of the new course (Computer-aided drug design).
- ❖ Dr. Easwaran, Biocon Research Academy, Bangalore, Advised to add concepts of tissue & receptors in Cell Biology. Upon discussion, the resolution was passed and recommended for the academic council.
- ❖ Dr. Ramgopal, Biocon Research Academy, Bangalore, Suggested to add Enzymes, carbohydrates and Bioenergetics to Biochemistry. Upon discussion, the resolution was passed and recommended for the academic council.
- ❖ Ms. Rishitha Challagulla, North Carolina, USA, Advised to add various DNA repair mechanisms to Molecular Biology. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Ms. Pavitra Etukuri, North Carolina, USA, Suggested adding structure of Immunoglobulin in the Immunology subject. Upon discussion, the resolution was passed and recommended for the academic council.

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- ❖ Mr. Nikhil Reddy, Maryland, USA, Added some microorganisms to Food Technology course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Divyanshu Dhakate, Ottawa, Canada, Suggested including thermodynamics of biological systems in Biology for Engineering. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Konda Reddy, Suggested revising course name of Basic Mathematics. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Dr. Sarda Prasanna, Suggested including new skilling courses in the 2021-2022 academic year. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. P. Sreenivasulu, NIT Warangal, Telangana, India, Suggested including a lab for Process Engineering principles and Microbial genetics should be added with lytic and lysogenic cycles. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Dr. Urmila Saxena, NIT Warangal, Suggested to include more skill based experiments in practical component. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Krishna Pramanik, NIT Rourkela, Increase the number of industrial visits and to add production cycles of amino acids and alcohols in Microbial Technology. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Sirsendu Ray, NIT Rourkela, Transfusion products and RBC control of blood products can be added. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Amit Srivastava, IIT BHU, UP, Recovery of ethanol, octane ring should be added in Bioresource Technology. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Sureshchandra, Uttarakhand University, Concepts of capital cost, recombinant products can be added in BEPD. Upon discussion the resolution was passed and recommended for academic council.


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- ❖ Dr. Ayan Sadhu khan, IIT Jodhpur, Rajasthan, suggested to include introduction of skilling for plant based labs. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Amjad Ali, NIT Patna, Emerging techniques in food preservation should be added in Food technology course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Pragyan Ranjan Rout, NIT Jalandhar Faculty recommended to have choice in revision or modification of course outcomes and BTL levels in their respective courses. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Bhisham Narayan Singh, MAHE, Karnataka, Suggested to include lab for Process Engineering principles and Microbial genetics should be added with lytic and lysogenic cycles. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Mahesh Kumar Sah, NIT Jalandhar, Conduction of more skill based experiments. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Vijay Rajesh, NRI Medical College, Increase the number of industrial visits and to add production cycles of amino acids and alcohols in Microbial Technology. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. Lakshmi Prasuna, NIT Bhopal, Transfusion products and RBC control of blood products can be added. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. G.Siva Reddy, KLEF, Recovery of ethanol, octane ring should be added in Bio resource Technology. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr. G.Koteswarar Reddy, KLEF, Concepts of capital cost, recombinant products can be added in BEPD. Upon discussion the resolution was passed and recommended for academic council.

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- ❖ Dr. K. Srinivasulu, KLEF, Introduction of skilling for plant based labs. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Dr.Vemuri Praveen, KLEF, Emerging techniques in food preservation should be added in Food technology course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Aparna Nimmagadda, Wipro, Bangalore, Foreign language should be given importance with credits to become confident enough to work across the globe. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Navyatha, MNNIT Bhopal, Concepts of Rheology, measurement and models of rheology can be added. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Rishitha Challagulla, North Carolina, USA, Suggested to add design equations for Enzyme reactors. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Pavitra Etukuri, North Carolina, USA, Animal cell culture skilling lab should be enriched with Tissue Engineering concepts and RDNA Technology. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Nikhil Reddy, Maryland, USA, for downstream processing, product enrichment operations should be added. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Divyanshu Dhakate, Ottawa, Canada, Basic metabolic cycles can be added for Biology for Engineers course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Kamujula Vandana, Ottawa, Canada, Emphasis on internships in abroad can be enhanced. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Nizamuddin Syed, Sydney, Australia Students should be encouraged to participate in National level seminars. Upon discussion the resolution was passed and recommended for academic council


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- ❖ Mr. Mohd. Anjum, Kaulalampur, Malaysia Visiting CSIR labs will be beneficial for students in their projects. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Vyshnavi Davulri, South Carolina, USA, Suggested to increase foreign language courses from second year itself. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Bhavana, suggested to cover the core topics of GATE syllabus in Curriculum. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Salman Khan, Types of indices such as B Tree, B plus Tree, Query processing can be added in Data base management course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Pushpa, Genetic manipulations of ESCs, homologous recombination of stem cells can also be incorporated in Stem cell Technology course. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Srinivas Bandi, Allow the students to go for more industrial tours for exploring manufacturing of various products. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Suhana Kousar, A course like Biomaterials can be introduced in Medical specialization. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Afeefah Farheen, New course like CADD can be added in Bioinformatics specialisation. Upon discussion the resolution was passed and recommended for academic council
- ❖ Mr. Suresh Kancham, Suggested to increase the number of industrial visits. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Naveen poturi, Intellectual property rights can be added as one of the elective courses. Upon discussion the resolution was passed and recommended for academic council.

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20/05/24

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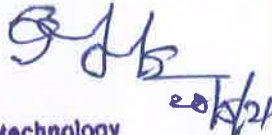
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- ❖ Ms. Rachel Kocherla, Advised to introduce lab for professional elective courses as well. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Ms. Sunandini Vedigandla, Suggested to implement "Industrial Visit" program for any food related industries. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Hussain Shaikh, Students want job oriented courses to be implemented. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Chandrasekhar suggested to Introduce NGS Sequencing and Data Analysis like courses for Bioinformatics specialisation. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mr. Subhash pal to enhance the practical knowledge of students by increasing lab experiments. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mrs. Sukanya Vemuri Conduct more hands on experiments and allow students to do more lab work. Upon discussion the resolution was passed and recommended for academic council.
- ❖ Mrs. Fareeha shaikh Encourage abroad internship for students who have good academic record. Upon discussion the resolution was passed and recommended for academic council
- ❖ Mr. Jonnalgadda Vinay Conduction of more skill based experiments. Upon discussion the resolution was passed and recommended for academic council
- ❖ Mr. Umesh Raj Lectures from Industrial experts should be improved for learning skills. Upon discussion the resolution was passed and recommended for academic council
- ❖ Mrs. Siddique Begum Series of foreign lectures could be increased for proper skills. Upon discussion the resolution was passed and recommended for academic council
- ❖ Mr. Salem Khan Suggested to include foreign internships from second year onwards. Upon discussion the resolution was passed and recommended for academic council


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- ❖ Mr. J Vinay, Lectures from Eminent people should be improved for students. Upon discussion, the resolution was passed and recommended for the academic council. Action Taken Report has been attached as **Annexure-IV**.

AGENDA ITEM-V

To consider and approve the pre-Ph.D courses for the July-2021 admitted batch of Ph.D	Approved and recommended to Academic Council
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RESOLUTION: Pre Ph.D courses and syllabi for July-2021 admitted batch of Ph.D have been approved by BoS members and recommended to Academic Council and the corresponding proofs have been attached in **Annexure -V**.

AGENDA ITEM-VI

To consider and approve the list of Professional and open elective courses introduced for 2021-2022 admitted batch.	Approved and recommended to Academic Council
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DISCUSSION:

- ❖ Dr. Ratna Sudha, MD, of Unique Biotech Pvt. Ltd., Hyderabad, Telangana, proposed the initiation of an **NGS Sequencing and Data Analysis** course, and following a thorough discussion, the resolution was successfully passed, subsequently recommending it to the academic council for approval as a new course. NGS Sequencing and Data Analysis was introduced in place of Bioperl and Perl programming.
- ❖ Dr. Rajesh, Scientist E at Sanofi Biotech, Medchal, Telangana, proposed the introduction of a **Biomaterials** course, and after extensive discussion, the resolution received approval, with a subsequent recommendation made to the academic council for the official sanctioning of the new course in Biomaterials.
- ❖ Dr. Alok Kumar of Sanofi Biotech in Medchal, Telangana, proposed the establishment of a **Computer-aided Drug Design** course. Following a comprehensive discussion, the resolution was successfully passed and

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subsequently recommended to the academic council for approval of the new course in Computer-aided Drug Design.

- ❖ Dr. Ankur Agarwal, Scientist E at Biological E limited, Hyderabad, Telangana, proposed the introduction of a new course entitled **Project based learning-1&2**, and after extensive discussion, the resolution received approval, with a subsequent recommendation made to the academic council for the official sanctioning of the new course Project based learning-1&2.
- ❖ Dr. Pratima Katukuri, CIMAP, Lucknow, Uttar Pradesh proposed the introduction of a new course entitled **Activity based learning** and after extensive discussion, the resolution received approval, with a subsequent recommendation made to the academic council for the official sanctioning of the new course Activity based learning.
- ❖ Dr. Nazem Baig, HCU, Telangana proposed the introduction of a new course entitled **Problem Solving Skills-I&II** and after extensive discussion, the resolution received approval, with a subsequent recommendation made to the academic council for the official sanctioning of the new course Problem Solving Skills-I&II.

RESOLUTION: Upon discussion, all the BOS members approved the incorporation of the following Professional and open elective courses into the curriculum from the Academic Year 2021-2022 which improves the various skill set of students in Biomaterials, NGS Sequencing and Data Analysis, Computer Aided Drug Design and to learn the aspects of quality control techniques concerning value added products by learning Project-based learning-1 & Project based Learning-2. Further, Students will be able to gain various skills (Technical and Administration skills) in Activity-based learning, and also students will improve their problem-solving skills by learning the Problem Solving skills-I & II.

1. Biomaterials
2. NGS Sequencing and Data Analysis
3. Computer Aided Drug Design
4. Project based learning-1
5. Project based Learning-2

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6. Activity based learning
7. Problem Solving Skills-I
8. Problem Solving Skills-II

The syllabus of the new courses have been depicted in **Annexure-VI**

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The following members have attended the XXIX Board of studies (BOS) meeting held on 19/05/2021 in offline mode from 10:00 am to 12:30 pm

S.No	FULL NAME	DESIGNATION	ORGANIZATION	POSITION IN THE MEETING	SIGNATURE
1	Dr.M Ratna Sudha	Managing Director	Unique Biotech Ltd-Telangana	External	
2	Dr.B Sridhar	Professor	Forest College and Research Institute-Mulguru-Telangana	External	
3	Mrs.Saradagandhi Kolli	Clinical Scientist-Next Generation Sequencing	Master Misericordiae University Hospital-Ireland	External	
4	Dr.K.Giridhar	Associate Professor & HOD	Biotechnology	Chairman	
5	Dr.V.Praveen Kumar	Alternate Head & Assoc. Professor	Biotechnology	Secretary	
6	Dr.JayaKumar Singh	Professor & Assoc. Dean	Biotechnology	Internal member	
7	Dr.K.Shrinivasulu	Professor	Biotechnology	Internal member	
8	Dr.BVLS Prasad	Professor	Biotechnology	Internal member	
9	Dr.Ashish Runthala	Assoc. Professor &	Biotechnology	Special Invitee	
10	Dr.M.Sudhamani	Assoc. Professor & Research Group Head	Biotechnology	Internal member	
11	Dr.M.Maheswara Reddy	Asst. Professor	Biotechnology	Internal member	
12	Dr.G.Siva Reddy	Asst. Professor-Professor incharge Academics	Biotechnology	Internal member	
13	Dr.Y V Rajesh	Asst. Professor-R Pac chairman	Biotechnology	Internal member	

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14	Dr.Nadeem Siddiqui	Assoc. Professor	Biotechnology	Special Invitee	<i>Nadeem</i>
15	Dr.Sarada Prasanna Mallick	Asst. Professor	Biotechnology	Special Invitee	<i>Mallick</i>
16	180010049- Ms.Polladi Bhavana	IV th Year	Biotechnology	Special Invitee	<i>Bhavana</i>
17	180010059- Ms.Vemuri Sarvani	IV th Year	Biotechnology	Special Invitee	<i>Sarvani</i>
18	190010067-Varugu Lasya Sri Yadav	IIIrd Year	Biotechnology	Special Invitee	<i>Lasya</i>
19	190010122-Nair Ayush Sasi Kumar	IIIrd Year	Biotechnology	Special Invitee	<i>Ayush</i>
20	2000010060-Aarya Harshal Suryawanshi	IInd Year	Biotechnology	Special Invitee	<i>Harshal</i>
21	2000010092- Cherkuri Anupama	IInd Year	Biotechnology	Special Invitee	<i>Anupama</i>

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20/10/21

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Annexure-I: Program structure (with all Courses) containing following categorization

Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requirement	New Course/R revised Course/Retained Course	Changes Proposed by	Focused on Employability/Entrepreneurship/Skill Development
20UC1101	Integrated Professional English	HSS	0	0	4	0	2	Nil	Retained Course		Employability
20UC1202	English Proficiency	HSS	0	0	4	0	2	Nil	Retained Course		Employability
21UC2103	Essential Skills for Employability	HSS	0	0	4	0	2	Nil	Retained Course		Employability
21UC2204	Corporate Readiness Skills	HSS	0	0	4	0	2	Nil	Retained Course		Employability
21UC0010	Universal Human Values & Professional Ethics	HSS	2	0	0	0	2	Nil	Retained Course		Universal Human values and professional ethics
20UC0007	Indian Heritage and Culture	HSS	2	0	0	0	0	Nil	Retained Course		Entrepreneurship
20UC0008	Indian Constitution	HSS	2	0	0	0	0	Nil	Retained Course		Entrepreneurship

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20UC0009	Ecology & Environment	HSS	2	0	0	0	0	Nil	Retained Course	Entrepreneurship
21UC0011	Gender Sensitization	HSS	2	0	0	0	2	Nil	Retained Course	Entrepreneurship
20MT1101	Mathematics for Computing	BS	2	2	0	2	4.5	Nil	Retained Course	Employability
21MT1011	Mathematical Methods	BS	2	1	0	0	3	Nil	Retained Course	Employability
21MT2011	Biostatistics	BS	2	1	0	0	3	Nil	Retained Course	Employability
20UC1102	Design Thinking and Innovation-1	BS	1	0	0	4	2	Nil	Retained Course	Skill Development
20UC1203	Design Thinking and Innovation-2	BS	1	0	0	4	2	Nil	Retained Course	Skill Development
21PH1005	Engineering Physics	BS	3	0	2	0	4	Nil	Retained Course	Employability
21CY1001	Engineering Chemistry	BS	3	0	2	0	4	Nil	Retained Course	Employability
21UC3105	Problem Solving Skills-I	BS	0	0	2	2	1.5	Nil	Retained Course	Skill Development
21UC3206	Problem Solving Skills-II	BS	0	0	2	2	1.5	Nil	Retained Course	Skill Development


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21SC1101	Computational Thinking for Structured Design	ES	3	0	2	6	5	5	Nil	Retained Course		Employability
20ME1103	Design Tools Workshop - I	ES	0	0	4	0	2	2	Nil	Retained Course		Employability
21SC1209	Design Tools Workshop - II	ES	0	0	4	0	2	2	Nil	Retained Course		Employability
21SC1202	Design of Data Structures	ES	3	0	2	4	5	5	20SC1101	Retained Course		Employability
21ES2103	Biochemical Thermodynamics	ES	3	0	0	0	3	3	Nil	Revised course	Academic Peers	Employability
21ES2101	Process Engineering Principles	ES	3	0	2	0	4	4	Nil	Revised course	Alumni	Employability
21ES2102	Transport Process in Biological Systems	ES	3	0	2	0	4	4	Nil	Revised course	Students	Employability
21BT1211	Cell Biology	PC	3	0	0	0	3	3	Nil	Revised course	Industry Peers	Employability
21BT2105	Biochemistry	PC	3	0	2	0	4	4	Nil	Revised course	Academic Peers	Employability
21BT2108	Molecular Biology	PC	3	0	0	0	3	3	Nil	Revised course	Industry Peers	Employability

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21BT2109	Immunology	PC	3	0	2	0	4	Nil	Revised course	Students	Employability
21BT3110	Bioinformatics	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability
21BT3111	Genetic Engineering	PC	3	0	2	0	4	Nil	Revised course	Academic Peers	Employability
21BT3112	Fermentation Technology	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability
21BT3113	Biochemical Reaction Engineering	PC	3	0	2	0	4	Nil	Revised course	Faculty	Employability
21BT3211	Plant and Animal Biotechnology	PC	3	0	2	0	4	Nil	Revised course	Alumni	Employability
21BT3212	Downstream Processing	PC	3	0	2	0	4	Nil	Revised course	Students	Employability
21BT2106	Microbiology	PC	3	0	2	0	4	Nil	Revised course	Academic Peers	Employability
21BT2107	Bioanalytical Techniques	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability

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21BT40A1	IPR & Patent Laws	OE	3	0	0	0	3	Nil	Retained Course	Industry Peers	Entrepreneurship
OEBT0002	Biomaterials	OE	3	0	0	0	3	Nil	New course	Industry Peers	Employability
OEBT0003	Computer Aided Drug Design	OE	3	0	0	0	3	Nil	New course	Industry Peers	Employability
21MB4056	Resources Safety and Quality Management	OE	2	0	0	0	2	Nil	Retained Course	No changes	Entrepreneurship
21MB4058	Construction project Management	OE	2	0	0	0	2	Nil	Retained Course	No changes	Entrepreneurship
21MB4051	Paradigms in Management Thought	OE	3	0	0	0	3	Nil	Retained Course	No changes	Entrepreneurship
21MB4052	Indian Economy	OE	3	0	0	0	3	Nil	Retained Course	No changes	Entrepreneurship
21MB4053	Managing Personal Finances	OE	3	0	0	0	3	Nil	Retained Course	No changes	Entrepreneurship
21MB4054	Basics of Marketing for Engineers	OE	3	0	0	0	3	Nil	Retained Course	No changes	Entrepreneurship
21MB4055	Organization Management	OE	3	0	0	0	3	Nil	Retained Course	No changes	Entrepreneurship

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21MB4057	Economics for Engineers	OE	3	0	0	0	3	Nil	Retained Course	No changes	Entrepreneurship
21FL3051	ARABIC LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3052	BENGALI LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3053	CHINESE LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3054	FRENCH LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3055	GERMAN LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3056	HINDI LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3057	ITALIAN LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3059	KANNADA LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3060	RUSSIAN LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development

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21FL3061	SIMHALI LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3062	SPANISH LANGUAGE	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21FL3058	JAPANESE LANGUAGE-1	OE	2	0	0	0	2	Nil	Retained Course	No changes	Skill Development
21IE2040	Social Internship	PR	0	0	0	4	1	Nil	Retained Course	No changes	Skill Development
21IE3041	Technical Internship	PR	0	0	0	4	1	Nil	Retained Course	No changes	Skill Development
21IE4042	Industry Internship	PR	0	0	0	4	1	Nil	Retained Course	No changes	Skill Development
21IE2046	Project Based Learning -1	PR	0	0	0	6	1.5	Nil	New course	Industry Peers	Skill Development
21IE2047	Project based learning -2	PR	0	0	0	6	1.5	Nil	New course	Industry Peers	Skill Development
21IE3043	Term paper	PR	0	0	0	4	1	Nil	Retained Course	No changes	Skill Development
21IE3044	Mid Grad Capstone Project - I	PR	0	0	0	8	2	Nil	Retained Course	No changes	Skill Development

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21IE3045	Mid Grad Capstone Project - II	PR	0	0	0	8	2	Nil	Retained Course	No changes	Skill Development
21IE4048/ 21IE4051/ 21IE4050	Project / Internship -1/Practice School	PR	0	0	0	16	4	Nil	Retained Course	No changes	Skill Development
21IE4049/ 21IE4052/ 21IE4050	Project / Internship 2/Practice School	PR	0	0	0	16	4	Nil	Retained Course	No changes	Skill Development
21BT3051	Molecular Genetics	PE	3	0	0	0	3	21BT3111	Revised course	Industry Peers	Employability
21BT3052	Transgenic Technology	PE	3	0	0	0	3	21BT3111	Revised course	Industry Peers	Employability
21BT3053	Molecular Expression Technology	PE	3	0	0	0	3	21BT3111	Revised course	Academic Peers	Employability

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21BT3054	Genomics and Proteomics	PE	3	0	0	0	3	21BT3111	Revised course	Students	Employability
21BT3055	Molecular markers and Diagnostics	PE	3	0	0	0	3	21BT3111	Revised course	Faculty	Employability
21BT3056	Gene and the Environment	PE	3	0	0	0	3	21BT3111	Revised course	Alumni	Employability
21BT3057	Microbial Genetics	PE	3	0	0	0	3	21BT3111	Revised course	Alumni	Employability
21BT3058	DNA Forensics	PE	3	0	0	0	3	21BT3111	Revised course	Academic Peers	Employability

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21BT3061	Microbial Technology	PE	3	0	0	0	3	21BT2 106	Revised course	Industry Peers	Employability
21BT3062	Pharmaceutical Biotechnology	PE	3	0	0	0	3	21BT2 106	Revised course	Students	Employability
21BT3063	Metabolic Engineering	PE	3	0	0	0	3	21BT2 106	Revised course	Faculty	Employability
21BT3064	Bio resource Technology	PE	3	0	0	0	3	21BT2 106	Revised course	Alumni	Employability
21BT3065	Bioprocess Economics and Plant Design	PE	3	0	0	0	3	21BT2 106	Revised course	Faculty	Employability

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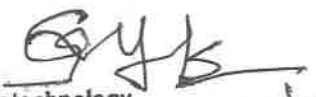
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21BT3066	Enzyme Engineering	PE	3	0	0	0	3	21BT2 106	Revised course	Industry Peers	Employability
21BT3067	Bioprocess Validation and cGMP	PE	3	0	0	0	3	21BT2 106	Revised course	Industry Peers	Employability
21BT3068	Food Technology	PE	3	0	0	0	3	21BT2 106	Revised course	Academic Peers	Employability
21BT3069	Pharmacovigilance and Safety	PE	3	0	0	0	3	21BT2 106	Revised course	Industry Peers	Employability
21BT3079	NGS sequencing and data analysis	PE	3	0	0	0	3	21BT3 110	New course	Industry Peers	Employability

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21BT3072	Biomedical Informatics	PE	3	0	0	0	3	21BT3110	Revised course	Alumni	Employability
21BT3073	Molecular Modelling and Drug Design	PE	3	0	0	0	3	21BT3110	Revised course	Industry Peers	Employability
21BT3074	Structural Biology	PE	3	0	0	0	3	21BT3110	Revised course	Industry Peers	Employability
21BT3075	Systems Biology	PE	3	0	0	0	3	21BT3110	Revised course	Alumni	Employability
21BT3076	Applied Bioinformatics	PE	3	0	0	0	3	21BT3110	Revised course	Academic Peers	Employability
21BT3077	Python and R Programming	PE	3	0	0	0	3	21BT3110	Revised course	Academic Peers	Employability
21BT3078	Data Base Management System	PE	3	0	0	0	3	21BT3110	Revised course	Alumni	Employability
21BT3081	Stem cell technology	PE	3	0	0	0	3	21BT1211	Revised course	Students	Employability

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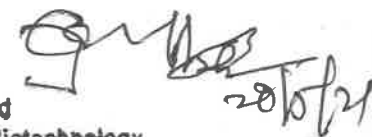
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21BT3082	Healthcare Biotechnology	PE	3	0	0	0	3	21BT1 211	Revised course	Industry Peers	Employability
21BT3083	Cancer Biology	PE	3	0	0	0	3	21BT1 211	Revised course	Industry Peers	Employability
21BT3084	Neurobiology	PE	3	0	0	0	3	21BT1 211	Revised course	Alumni	Employability
21BT3085	Bioelectronics & Biosensors	PE	3	0	0	0	3	21BT1 211	Revised course	Academic Peers	Employability
21BT3086	Tissue Engineering	PE	3	0	0	0	3	21BT1 211	Revised course	Academic Peers	Employability


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21BT3087	Virology	PE	3	0	0	0	3	21BT1 211	Revised course	Alumni	Employability
21BT3088	Nano biotechnology	PE	3	0	0	0	3	21BT1 211	Revised course	Students	Employability
21CC3001	Base SAS	CC	0	0	0	8	0	NIL	Retained Certificate Course	Academic Peers	Employability
21CC3002	Clinical Data management	CC	0	0	0	8	0	NIL	Retained Certificate Course	Alumni	Employability
21CC3003	Regulatory affairs and clinical trails	CC	0	0	0	8	0	NIL	Retained Certificate Course	Students	Employability

Percentage of Syllabus Revision= $47 \times 100 / 85 = 55.29\%$

Percentage of Courses focusing on Employability= $58 / 85 = 68.23\%$

Percentage of Courses focusing on Entrepreneurship= $10 / 85 = 11.76\%$

Percentage of Courses focusing on Skill Development = $17 / 85 = 20\%$


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Course Code	Course Name	Course Category	L	T	P	S	CR	Pre-Requisite	New Course/ Revised Course/ Retained Course	Changes Proposed by	Focused on Employability /Entrepreneurship/ Skill Development
21BT5101	Mathematics and Biostatistics	PC	3	2	0	0	4	Nil	Revised course	Alumni	Employability
21BT5102	Biochemical Engineering	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability
21BT5103	Molecular Biology and r-DNA Technology	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability
21BT5104	Applied Bioinformatics	PC	3	0	2	0	4	Nil	Revised course	Alumni	Employability
21IE5148	Seminar	PR	0	0	4	0	2	Nil	Revised course	Alumni	Skill development
21BT5105	Plant and Animal Biotechnology	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability


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21BT5106	Immunotechnology	PC	3	0	2	0	4	Nil	Revised course	Industry Peers	Employability
21BT5107	Bioreactor modelling and Simulation	PC	3	2	0	0	4	Nil	Revised course	Alumni	Employability
21BT5108	Downstream Processing	PC	3	0	2	0	4	Nil	Revised course	Academic Peers	Employability
21IE5149	Term paper	PR	0	0	4	0	2	Nil	Revised course	Industry Peers	Skill development
21IE6050	Dissertation / Practise School	PR	0	0	72	0	36	Nil	Revised course	Industry Peers	Skill development
21BT51A1	Protein Engineering	PE	3	0	0	0	3	NIL	Revised course	Alumni	Employability
21BT51A2	Enzyme Technology	PE	3	0	0	0	3	NIL	Revised course	Academic Peers	Employability
21BT51A3	Medical Biotechnology	PE	3	0	0	0	3	NIL	Revised course	Academic Peers	Employability
21BT51A4	Stem cell technology	PE	3	0	0	0	3	NIL	Revised course	Alumni	Employability
21BT51A5	Molecular Modelling and Drug Design	PE	3	0	0	0	3	NIL	Revised course	Industry Peers	Employability


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21BT51B1	Food Technology	PE	3	0	0	0	3	NIL	Revised course	Industry Peers	Employability
21BT51B5	Bioreactor Operations	PE	3	0	0	0	3	NIL	New course	Alumni	Employability
21BT51B3	Bio mining	PE	3	0	0	0	3	NIL	Revised course	Academic Peers	Employability
21BT51B4	Bioprocess validation and cGMP	PE	3	0	0	0	3	NIL	Revised course	Academic Peers	Employability
21BT52C6	Computational programming for Biologists	PE	3	0	0	0	3	NIL	New course	Alumni	Employability
21BT52C2	Bioprocess Technology	PE	3	0	0	0	3	NIL	Revised course	Industry Peers	Employability
21BT52C3	Environmental Biotechnology	PE	3	0	0	0	3	NIL	Revised course	Industry Peers	Employability
21BT52C4	Nano Biotechnology	PE	3	0	0	0	3	NIL	Revised course	Alumni	Employability
21BT52C7	Intellectual Property Rights, Bio safety and Bioethics	PE	3	0	0	0	3	NIL	Revised course	Academic Peers	Employability
21BT52D1	Regulatory affairs & Clinical trials	PE	3	0	0	0	3	NIL	Revised course	Academic Peers	Employability
21BT52D2	Bioprocess economics and plant design	PE	3	0	0	0	3	NIL	Revised course	Alumni	Employability

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21BT52D5	Methods in genomics, transcriptomics, proteomics and metabolomics	PE	3	0	0	0	3	NIL	New course	Industry Peers	Employability
21BT52D6	Advanced Biocatalyst and Biocatalysis	PE	3	0	0	0	3	NIL	Revised course	Industry Peers	Employability

Percentage of Syllabus Revision= $15 \times 100 / 29 = 51.72\%$

Percentage of Courses focusing on Employability= $27 / 29 = 93.10\%$

Percentage of Courses focusing on Skill Development = $2 / 29 = 6.89\%$


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Annexure-II: Course wise Syllabus revision of approved structure as mentioned in Annexure-I

Course Code	Course Title	Course Category	Existing Syllabus	New Syllabus	Topics added/ removed/ replaced	Changes in Course Outcome(s)	Justification for the modifications	Revision (%)
21BT1211	Cell Biology	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/Ea9HlE6P77NBsdClwDile0cByBZSnfFziCr29KQq8QRggg?e=Jzk0dY	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EaotMyGxj6xOvld2sKoiuuABLFBpCP7Ktsm3izDGZV1p7w?e=49FPkW	Tissues & Receptors-Meristems, Simple, complex and special tissues. Growth patterns, Cell growth and mechanisms. Embryonic development, Organogenesis, metamorphosis, Cell signalling-Membrane receptors, Cell - Cell interactions.	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT2105	Biochemistry	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EXeDT5x0mXJMqua3o6g7v-oB1Mj3v5P99ss8USIaBruRKA?e=R9566s	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EYeJue2v7Z5Pq1LA7BbPtCk4XX--EY-EtTqUVBsI5VWCQ?e=dgg9xd	Enzymes, Carbohydrates and Bioenergetics	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10


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21BT2108	Molecular Biology	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ERRRYSGuLExOnk-AbVAzAccBPO7Ww4Y7m-pesVT5dt3g?e=fahrTM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/Ec7g50IgLtNqu60VSdXz5UB9av-dgwljebdncEIM9PNag?e=KYdbx1	Repair Mechanisms- Direct Repair, Excision Repair, Mismatch Repair, SOS Repair and Recombination Repair	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT2109	Immunology	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EUhgSGjgWb-ZKmm7InWr12uUBSgXT9-MXgb0a9a6VcHz8Q?e=wSzGU7	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ERBkmMghwUIPpY4MzRVIZowBxUfY8jgoSazNz7UVzPI-Q?e=094ziW	Immunoglobulins- Structure, types, subtypes and functions. Antibody genes and generation of diversity, Production of monoclonal antibodies	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3110	Bioinformatics	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EVIDbimNPv90jGALdeKDWiYBRSPkWRyRdyk0D2r0LaI8w?e=YYNoBa	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EYibhFHmX7tHjCaX9QkkM-sBTtmDwL979-Iiu-OLoIq4ww?e=tWC5yt	machine learning: classification, regression, svm, decision trees, artificial neural networks, big data in biology. Genome informatics: genome sequencing technologies and analysis methods; human genome project, application of genome mapping, DNA microarrays.	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10

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21BT3111	Genetic Engineering	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EcXTA-ltW-ZGtTDfRjurfZUBQ5kMXUDdzcKd5TegdzXpJA?e=HPueeK	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ERVW6nEMEGBPi84rJmfnWmQBV-wVPwSNNIhmTdArnkCXkg?e=2H2p1B	Screening of clones - Genetic methods, Immunological methods, Hybridization methods.	C02	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3112	Fermentation Technology	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ETHkRkEe_tNIsRz0XJInSXM Bm-j4pXLeGSzSpmZzNM7n5A?e=1czjjP	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EbB8ycjCjpdKmsbMZCXEE7EB9LUC78chz-20txdf3BzOiA?e=Qh7YND	Rheology of fermentation broths; Rheological models; Measurement of rheological parameters	C04	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3113	Biochemical Reaction Engineering	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EdaKYgDg8x5PjOxFA-i4jToB8NDdL_81SbEbZyY2Hwjt8g?e=N9C9y_i	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EaTuxamf5d9LmS_ZQr3OXsQB_VaT9bVSN6GMboQqH1_eew?e=WS8cIz	Design equations for enzyme reactors Estimation of kinetic parameters	C04	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5


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21BT3211	Plant and Animal Biotechnology	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EZYgbA32QuJEinoD1YrePhcBnKCcYsw28Q7MOhfRSm-Q?e=EGjvrV	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ETgjnr6SFLklm3Tk0mBboBL261Zfdoga2Hfc8v-vN3Ow?e=WDeuk6	Animal Cell Culture, Growth and Scale Up, Transgenic Animals and Recombinant DNA Technology, Tissue Engineering and Regenerative Medicine:	C03,C04,	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3212	Downstream Processing	PC	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EdW5Q_uHcl4lOgE23GkblHz8Be491R2MhGtbVFfv7A-j8TQ?e=zScTw2	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EUrDI4IwFwNHm5PDPPrsS93gBCzK1iE-u-3-aDuMs6FVf2Q?e=cs47Jb	Product Enrichment Operations: Aqueous two-phase extraction process: Applications of aqueous two-phase extraction, reversed micelles extraction principle, reversed micellar extraction principle, micelle structures, critical micelle concentration. Protein solubilization, limitation of reversed micelles. Precipitations of proteins with salts and organic solvents, kinetics of protein aggregation	C01,C02,C03,C04	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10


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21ES2103	Biochemical Thermodynamics	ES	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsva_kluniversity_in/ER9ujdcp7XVMhmgRt00EVU8BEQzBCrE6cyZVuID01E-lSg?e=QlxSkd	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsva_kluniversity_in/ER4tSFv8LEhPpMclPdQADSkBK81MVp62BBerwqZigs-Ksg?e=ABEirQ	Biochemical thermodynamics: Energetics of metabolic pathways, Energy coupling (ATP &NADH), Energetic analysis of cell growth and product formation. Thermodynamics of microbial growth, oxygen consumption and heat evolution in aerobic cultures, energy balance equation for cell culture, reaction thermodynamics.	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21ES2101	Process Engineering Principles	ES	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsva_kluniversity_in/EeLfYe0-GslFtUjSN1_tOYwBBO-F4rjPxxkKMJ7SiOLJ2rg?e=0ntACH	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsva_kluniversity_in/Ecv2lJGrSv1Pq9HJYlowcEoBACAwQvRkCe8pGHZnE7j9mQ?e=c p7fSR	Overall and Component Balance : Evaporator, Distillation, Extraction, Drying, Crystallization, Filtration and Mixing	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21ES2102	Transport Process in Biological Systems	ES	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsva_kluniversity_in/ETjTQ6zo91hOhBSU7G7vZ4oBF11knjKo3ClxuInJ-UkLJA?e=xhARcY	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsva_kluniversity_in/EazmKsSsOgNHgLPSh2RzxsByzZwX2vPj8cRIABKOht1SQ?e=du2sQE	Oxygen requirement of microbial cultures. Oxygen transfer by aeration and agitation. Determination of oxygen mass transfer coefficient by various methods.	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10

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21BT1001	Biology for Engineers	BS	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EZGZsxW7utBPoNZvenUOGE4BS2iSxKqH_CSkQw0r97efvg?e=VU19Va	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EQKL2bT5x-xLr1f5hjhzyI4BJYYduCzRufjhNKKlpRjcMg?e=9EMx0z	Thermodynamics of biological systems, Requirement of ATP, Glycolysis, Krebs cycle, Photosynthesis, Identification and classification of microbes, Microbial growth kinetic, sterilization and sterilization techniques	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3051	Molecular Genetics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ERef6mMGB7dLoyhmJfkcaXEbuYVVfv6IMjqdFfCaOjWqwg?e=NQ1PFA	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EQo1PXPToj9Li0_W3Cc2kMUB4pig5NhxkLkSCMoOSQP9kw?e=P64egz	Different models of homologous recombination. Molecular mechanisms of recombination: Base pairing, Nick initiation, Homologous recombination, Cross strand exchange	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3052	Transgenic Technology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EQNcq aMA_u9DhWf032Z-QMoBXDFXtuBEZMBN TdvjHT-1Ug?e=7dhgvI	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EZyC2qEfgTlJqMhX2kF6VUQBrTotvJ7UUamOjrHMqiRs0w?e=M oU3yK	Gene Therapy Approaches to Duchenne Muscular Dystrophy	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5

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21BT3053	Molecular Expression Technology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ES5d8zokoVBvO7J52giewsbYd76Q939QvdjwlebBH6iZQ?e=uXPE9L	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ETVi9TQVZjZEnCgu114UYcBBXTZ8VYwu2r0isCYugRTHA?e=LLyOwF	His-tag, GST-tag, MBP-tag. Factor X, Enterokinase signal cleavage.	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3054	Genomics and Proteomics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EXs986IHH29OhhJfjXT7aABTG8UjCRmTev8cHzaMzqpw?e=KUc800	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ER8p2sjkuvRNq9DSKdnTAN0Bv9B1NUnIX_wGK4YXZSDpLA?e=AhI6YG	Pharmacogenomics, Genomics in relation to molecular Diagnosis, Role of genomics in Drug discovery and development	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3055	Molecular markers and Diagnostics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EeNoIwliQpVApR1qNV4_C58B7_oiljat2VXyZO44Z93Wjw?e=bGvdGn	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EbU9Q1SjZIIpo3l2dCn7NKsBBMbnYH8RFnN5fclslsBhBw?e=7YjMf3	2D analysis of such proteins by sequencing individual spots by Mass Spectrometry, ELISA and Western blot	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5


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21BT3056	Gene and the Environment	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EfHlP5IyyEdFhDN423UmelcBCIP2D9Rf24KaLGB1P-LduQ?e=uWL0pt	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EaN0ihkktYtNns1hDAXUSN8Bgc2HtqtQ5AMwjPvNNH4ozw?e=8Piz2z	The potential for superoxide, hydrogen peroxide and nitric oxide to cause DNA damage, Chemical Stress Nutrient Stress Pathogen and Wounding Stress	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3057	Microbial Genetics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ET0cNlpYsmdJp4DnSqTAGtsBcBVgrklfkWZZBkwGYDyCYg?e=gqMub3	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EVCbesUlh0xImPZTDgVxe84BnH0cGuy8oKBpvALYADmxqQ?e=7VEkkL	gene expression and genome organization, λphage – replication, lytic and lysogenic cycles, transcription of phage genes, mechanisms of repressor synthesis and its control	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3058	DNA Forensics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EUPmXDSXanpCiO23FeEMlCIBHlkQbml25IF0xMy1iNB91w?e=KWcDgk	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EYBAaBgh8GRGsGTL3lM58BABlBNB0ofuYTCXjilE7lapNQ?e=j0Wryf	VNTR, SNP, SINES, LINES, SSR, STR, Mini and Micro Satellites	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5


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21BT3061	Microbial Technology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/Edzu-3SdJHRHguhDturxj-QBtxohuT8cl-R5vaaQOsyn5Q?e=NJmjpV	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EfxxR2VCZpKq27TmXACQOAB-dG3aId3Tk0xpfoK2o-CQ?e=h3Lfi9	Amino acids (Glutamic Acid, Lysine, Aspartic Acid and Phenylalanine);and Alcohols (Ethanol, 2,3-butanediol)	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3062	Pharmaceutical Biotechnology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EehN5b-wX7VOI3rZFAEARLQBfK78rIXUgdSnIWNVIvwwVw?e=z5gDdy	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EbsbTk6ThtpJvIz9m68UBKMBbmLjexfQU8fexK6N9CeA?e=UW0WPV	Concentrated human RBC Control of Blood products; Transfusion products.	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3063	Metabolic Engineering	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/Ebl-39A00LVJiMMiPq6g4cBqE6zZTyP1UH2TvuZFR2NYA?e=f1AVg6	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EQfu9kqnk_tGpZAyFcU8T3QBjST5dxtNe5GBsKAOajqqw?e=vRE32Q	metabolic pathway, manipulations to improve fermentation, Feedback repression, Catabolite, Repression, optimization and control of metabolic activities	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5


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21BT3064	Bioresource Technology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EXN0VAAddUmVEpinvxCxTX2wBSCYKpsPyDPFb3Cd2i3bEWw?e=Pcoz8U	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EWV4VRtDoH9EnrcN9L-9pYEBHRkiH1bH4dNhQCESHVEGEw?e=vZHXC	ethanol recovery - Biobutanol production, energy content and effects on fuel economy - Octane rating, air fuel ratio, specific energy, viscosity, heat of vaporization - Butanol fuel mixtures	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3065	Bioprocess Economics and Plant Design	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EW3LaG03tAhKt3B8aRV5t8BVforjq6YxPRTR7PLRIXWDA?e=FdcYnb	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ETBvSTX5eBLtkxZTygKktsBmwfXuDde4c-0SJ-5e8TIXA?e=TzVZ6L	capital cost estimates large-scale equipment and utilities case studies of antibiotics, recombinant products, single cell protein. Design calculations for immobilized enzyme kinetics	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3066	Enzyme Engineering	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EbwW0gttuR5Aq-UAton0UIUBrxE-iEbBM6VFBmQXqiT8xA?e=5gBjDn	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EfuyvKMMyzvVGmuTn4I2S8A8B-Orc1xDcgEY4ApoNOU-81w?e=wNqgFX	Kinetics of a single-substrate enzyme catalysed reaction Reversible Covalent Modification and Proteolytic Activation. Organisation of enzymes in the cell ELISA. Biosensors	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3067	Bioprocess Validation and cGMP	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EW3LaG03tAhKt3B8aRV5t8BVforjq6YxPRTR7PLRIXWDA?e=FdcYnb	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EW3LaG03tAhKt3B8aRV5t8BVforjq6YxPRTR7PLRIXWDA?e=FdcYnb	Guidelines and regulation of FDA and ICH for GLP.	CO3	As per the feedback received from the stake holders	5

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			kluniversity in/EeNz0RJXY45Mvw7DR07FbBoBsc1bw5maEG3RZK5wqCn1xw?e=YOpELD	niversity in/Ee5nfnqIGY5DkGfAKf vXtAB4GviEtMEnE1ZTf HBWGEgg?e=4lZoB	Good Manufacturing Practices Quality control of a product, Good manufacturing practices, cGMP, GMP of industries, Sanitation & Hygiene, Control of finished products, Maintenance of materials in laboratories, Zero contamination		we have revised the syllabus for 2021-22 batch.	
21BT3068	Food Technology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EX0TE-TEkMVDiX7SNTLQzmlBXstAsWIJ94qb5ILRqkWctQ?e=sFmsGc	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EcW5IH8o6qtEhadmof4nQkwBS4_dDDSXMl02vc8f89VUgg?e=g4wVdm	Emerging processing and preservation technologies for milk and dairy products. Food preservation: Food preservation using irradiation, Characteristics of Radiations of interest in food preservation. Principles underlying the destruction of Microorganisms by irradiation, processing of foods for irradiation	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5

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21BT3079	NGS Sequencing and Data analysis	PE	REFERENCE SYLABUS: AICTE MODEL CURRICULUM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ETwX5vhyN490o6Ual6yXZ9gBxD0lv7ifaMHNq-Vyy2vffQ?e=G05Fpi	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	100
21BT3072	Biomedical Informatics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EY6xeeBrxeBMuuOR6PPdH1oBb09YeefS3SCvQU5O4NJDqw?e=kVzq3Z	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ET2n0Szz0b5Ag4ALIM51qDUBnyDFEBu62k2ipzHccbwc1Q?e=rXwXYx	Symbolic biomedical knowledge Web 3.0. Ontologies as formal and explicit specification of objects, properties and relations in organizing biomedical data	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3073	Molecular Modelling and Drug Design	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EeRw87ZIn5xOgz4W0Ba3WRgBLhM4XPP0Z5O7FlpXGMuNTg?e=rcBaAp	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EcyQ8qClKfMusmS1Jnteb8Bm9q3frf45pczhRjmtzL5rg?e=qOs8vV	Protein structure Determination	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	20


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21BT3074	Structural Biology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/Eb6tb5wvJSFct46dFCbnWRwBTd1yQjlzqAjVvgE-Tkq28A?e=DL2dHg	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EUwD3mHrbdNnNiN2rgxIQsB9hamo13PR38sAluTdCrLzw?e=HSg3Q4	Concepts in 3D structure comparison, purpose of structure comparison, Algorithms for structure comparison (FSSP, VAST & DALI), Structure-function relation, Function inference from structure.	CO3	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3075	Systems Biology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EbKrym0UxEFLmfNn4BYhKkBXu21qGX3VEQBaZwdIWuIg?e=QlIn9x	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EewpvEqXaVVDnxo30UnM5SUBNrIEq5tHYZ0HQLN0FE1OA?e=50lovH	COMPUTER SIMULATIONS OF DYNAMIC NETWORKS.	CO4	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5
21BT3076	Applied Bioinformatics	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ESuWu1TdyUIPii2Q7x_nB_wBUvVZCoKfCZNf40VFEweXQ?e=CYZA1o	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EQEjVF5n8gRBr2669UpuTFEBMrpp8svPIVXSnmqlhXnw?e=Gm4DZl	Network Mapping; Biological Pathway dbs - EcoCyc, KEGG; Pathway prediction; Metabolic pathway reconstruction	CO1	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	5

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21BT3077	Python and R Programming	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EVvIGTBPQvtEhLO1CooQzXUBEKfjREF_9nHgrPF3K1emqw?e=Lar1AN	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ESD0RqphoYFOjnIsELPmJJYBw5l67ZqrhajTemSh89p1w?e=QCFixV	principal component analysis, fourier transforms, numerical sequence alignment	CO2	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3078	Data Base Management System	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EfW8O2fYRN5MiGn_Nioo0DUBL19u7dbF65LSCdEztco_rQ?e=lj4TaF	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EUzCo82w8zBARxa61COglDABbE4wk-V71FhpGtLRXkAIRA?e=zNB1Rt	Different types of Indexes- B-Tree - B+Tree - Query Processing Deferred Update - Shadow Paging XML - Structure of XML	CO2	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10
21BT3081	Stem cell technology	PE	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EWj5l4QYZKpGko1Gz4hM97MB-xKgK9P7eMdhgYu1WqNr5g?e=svocPd	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/Ebuy-00fte1LkbxOrrHFALEB53FFWVggsikkEkgSixvm5g?e=UHNWBg	Genetic manipulation of Embryonic Stem cell, homologous recombination of stem cells	CO2	As per the feedback received from the stake holders we have revised the syllabus for 2021-22 batch.	10


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21BT40A9	Biomaterials	PE	REFERENCE SYLABUS: AICTE MODEL CURRICULUM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EeNxq0dthgBDr6Osksw2aUEByE1MdyxbM-irMvflIryoCA?e=JpNMaz	NEW COURSE	CO1,CO2,C03,C04	As per the feedback received from the stake holders we have Introduced new course in 2021-22 batch.	100
21BT40C5	Computer Aided drug design	PE	REFERENCE SYLABUS: AICTE MODEL CURRICULUM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ERE3l9xfGsRptkhM8UUD-yYBOPRjdI8tI0CadkCZvjzmtg?e=SoEQPy	NEW COURSE	CO1,CO2,C03,C04	As per the feedback received from the stake holders we have Introduced new course in 2021-22 batch.	100
21 BT 51B5	Bioreactor Operations	PE	REFERENCE SYLABUS: DBT MODEL CURRICULUM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EVtorrU5aHRLgGBNA-OWKKcBdHihXIZRkHYeyl1HJjvlQ?e=A4g7Kf	NEW COURSE	CO1,CO2,C03,C04	As per the feedback received from the stake holders we have Introduced new course in 2021-22 batch.	100
21 BT 52C7	Intellectual Property Rights, Biosafety and Bioethics	PE	REFERENCE SYLABUS: DBT MODEL CURRICULUM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/ETP0HPavSqPfiK6fLEzBOD4ByM44AFdEtKpozVCIT8n5Bw?e=NYulcX	NEW COURSE	CO1,CO2,C03,C04	As per the feedback received from the stake holders we have Introduced new course in 2021-22 batch.	100

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21 BT 52D5	Methods in genomics, transcriptomics, proteomics and metabolomics	PE	REFERENCE SYLABUS: DBT MODEL CURRICULUM	https://kluniversityin-my.sharepoint.com/:w:/g/personal/gsiva_kluniversity_in/EQxdkMIEp4VFrG59-YybDSwBPmA_Kuqtg7iDwiHEoStC3w?e=6DecRs	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stake holders we have Introduced new course in 2021-22 batch.	100
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Annexure III

Minutes of the XXIX DAC meeting-Department of Biotechnology held on 15-05-2021 in online mode from 10:00 AM to 11:30 AM

Agenda Item-I

PDD of new program Structure highlighting, Local/Regional/National/Global needs and Mapping to courses.	Approved
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Resolution: PDD of new program Structure highlighting Local/Regional/National/Global needs and Mapping to courses has been approved and recommended to BoS by DAC.

Agenda Item-II

To consider the approval of proposal for launching certificate courses for 2021-22 admitted batch.	Approved
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Resolution: The following value added courses for Y21 batch have been introduced, approved and recommended by DAC to BoS.

1. Base SAS
2. Clinical data management
3. Regulatory affairs
4. Sports

Agenda Item-III

Proposal of B.Tech and M.Tech Y21 batch structure along with Employability, Entrepreneurship and skill development categorizations.	Approved
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Resolution: For the A.Y. 2021-22 curriculum, Basic Mathematics course should be mandatory for students with PCB background. Similarly, Basic biology should be mandatory for students with PCM background joining in B.Tech Biotechnology.

The same resolution of Basic mathematics and Basic biology courses for PCB and PCM students has been accepted by the Department Academic Council (DAC).

As per the feedback from stakeholders, Basic mathematics course has been renamed has mathematical methods.

Further, change in the course titles and syllabi of Genetic Engineering, Process Engineering principles and Microbial Technology have been recommended by DAC committee to BoS.

The same resolution of modifying the syllabi of Genetic Engineering, Process Engineering principles and Microbial Technology has been accepted by the Department Academic Council (DAC).

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By implementing the proposed modifications, course structure of 2021-22 admitted batches is under the categories of Employability, Entrepreneurship and skill development and the same will be recommended to BoS.

Agenda Item-IV

Restructuring of existing curriculum and syllabi for the year Y21 and Y20 batches.	Approved
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Resolution: As per the suggestions of DAC members, the existing course structures of Y21 and Y20 has been modified and recommended to BoS.

DAC has approved the revised course structures of Y21 and Y20 and the amended structures attached in **Annexure-I**.

The following courses of Y21 and Y20 batches have undergone the changes in their syllabi

1. Biochemistry
2. Microbiology
3. Molecular Biology
4. Cell Biology
5. Biochemical Thermodynamics
6. Downstream Processing
7. Metabolic Engineering
8. Single variable calculus and Matrix Algebra

The following courses of Y20 batch have undergone the changes in their syllabi

1. Tissue Engineering
2. Bioprocess Economics and Plant design
3. Biochemical reaction Engineering

The following courses of Y19 batch have undergone the changes in their syllabi

1. Molecular Expression Technology

DAC has approved the revised syllabi of above mentioned course recommended to BoS.

Vote of thanks:

The chair has thanked all the DAC members for their efforts and active participation


Professor in charge Academics


Head of the Department 20/5/21

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Annexure-IV: Feedback from Various stake holders

Stakeholder Category	Stakeholder Feedback / Recommendation	Action Taken in BOS	Name of the Programme	Academic Year	Department	Date of BOS
Industry Personnel	Dr. Ratna Sudha, MD, Unique Biotech Pvt.ltd, Hyderabad, Telangana, NGS and RNA Sequences course to be floated	Course is floated under "Bioinformatics" specialization approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Dr. Indrani, Research Head, Unique Biotech Pvt.ltd, Hyderabad, Telangana, Genetics course to be incorporated	Course is incorporated under professional courses approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Dr. Rajesh, Scientist E, Sanofi Biotech, Medchal, Telangana, Biomaterials course to be floated	Course is floated under Open electives approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Dr. Alok Kumar, Sanofi Biotech, Medchal, Telangana, Computer aided drug design course to be floated	Course is floated under Open electives approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Industry Personnel	Dr. Easwaran, Biocon Research Academy, Bangalore, Advised to add concepts of tissue & receptors in Cell Biology	Suggested topics were added approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Dr. Ramgopal, Biocon Research Academy, Bangalore, Suggested to add Enzymes, carbohydrates and Bioenergetics to Biochemistry	As per the suggestions, Suggested topics were added and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Miss. Rishitha Challagulla, North Carolina, USA, Advised to add various DNA repair mechanisms to Molecular Biology	Suggested topics were added and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Miss. Pavitra Etukuri Challagulla, North Carolina, USA, Suggested to add structure of Immunoglobulin in Immunology subject	As per the suggestions, Suggested topics were added and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Industry Personnel	Mr. Nikhil Reddy, Maryland, USA, Add some microorganism to Food Technology course	As per the suggestions, Suggested topics were added and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Industry Personnel	Mr. Divyanshu Dhakate, Ottawa, Canada, Suggested to include thermodynamics of biological system in Biology for Engineering	Suggested topics were added and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr.Konda Reddy, Suggested to revise course name of Basic Mathematics.	Resolved to modify as Mathematical methods and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Sarda Prasanna, Suggested to include New skilling courses in 2021-2022 academic year.	Medical Laboratory Technology and Process Engineering Tools skilling courses has been floated from Y20 batch and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. P. Sreenivasulu, NIT Warangal, Telangana, Inida, Suggested to include lab for Process Engineering principles and Microbial genetics should be added with lytic and lysogenic cycles.	Lab for PEP was included as per the suggestions received and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Academic Peer	Dr. Urmila Saxena, NIT Warangal, Suggested to include more skill based experiments in practical component.	Increased the number of experiments in skilling related courses and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Krishna Pramanik, NIT Rourkela, Increase the number of industrial visits and to add production cycles of amino acids and alcohols in Microbial Technology	Suggested topics were added and number of industrial visits will be increased from 2 to 4 and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Sirsendu Ray, NIT Rourkela, Transfusion products and RBC control of blood products can be added	Suggested topics were added and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Amit Srivastava, IIT BHU, UP, Recovery of ethanol, octane ring should be added in Bio resource Technology.	As per the suggestions, Suggested topics were added approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Suresh chandra, Uttarakhand University, Concepts of capital cost, recombinant products can be add in Bioprocess Economics and Plant design.	Suggested topics were added approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Academic Peer	Dr. Ayan Sadhu khan, IIT Jodhpur, Rajasthan, suggested to include introduction of skilling for plant based labs	Skilling for Plant Biotechnology has been incorporated approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Amjad Ali, NIT Patna, Emerging techniques in food preservation should be added in Food technology course	Suggested topics were added approved by BoS and eventually recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Rakesh Naidu, NIT Tiruchirapalli, Change of LTP structure for Indian Heritage Culture and Indian Constitution courses and these courses to be offered as Audited courses	0-0-2 has been modified as 2-0-0, and resolved to offer as audited courses from Y18 regulation approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Pragyan Ranjan Rout, NIT Jalandhar Faculty recommended having choice in revision or modification of course outcomes and BTL levels in their respective courses	Resolved to have flexibility in change of course outcomes and BTL levels that can match with market potential.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Academic Peer	Dr. Bhisham Narayan Singh, MAHE, Karnataka, Suggested to include lab for Process Engineering principles and Microbial genetics should be added with lytic and lysogenic cycles.	Lab for PEP was included as per the suggestions received and approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Mahesh Kumar Sah, NIT Jalandhar, Conduction of more skill-based experiments	Increased the number of experiments in skilling-related courses approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Vijay Rajesh, NRI Medical College, Increase the number of industrial visits and added production cycles of amino acids and alcohols in Microbial Technology	Suggested topics were added and a number of industrial visits will be increased from 2 to 4 approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. Lakshmi Prasuna, NIT Bhopal, Transfusion products, and RBC control of blood products can be added	Suggested topics were added approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021


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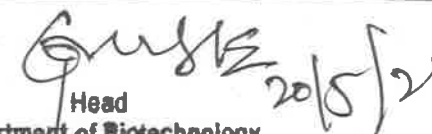
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Academic Peer	Dr. G. Siva Reddy, KLEF, Recovery of ethanol, octane ring should be added in Bioresource Technology.	As per the suggestions, topics were added approved by BoS, and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. G.Koteswara Reddy, KLEF, Concepts of capital cost, recombinant products can be added in Bioprocess Economics and Plant design	Suggested topics were added approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr. K. Srinivasulu, KLEF, Introduction of skilling for plant-based labs	Skilling for Plant Biotechnology has been incorporated and approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Academic Peer	Dr.Vemuri Praveen, KLEF, Emerging techniques in food preservation should be added to Food technology course	Suggested topics were added approved by BoS and eventually recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Miss. Aparna Nimmagadda, Wipro, Bangalore, Foreign language should be given importance with credits to become confident enough to work across the globe	One foreign language is proposed to be introduced from Y18 batch and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021


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Alumni	Miss. Navyatha, MNNIT Bhopal, Concepts of Rheology, measurement and models of rheology can be added	As per the suggestions, concepts of Rheology were added and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Miss. Rishitha Challagulla, North Carolina, USA, Suggested to add design equations for Enzyme reactors	Suggested topics were added and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Miss. Pavitra Etukuri North Carolina, USA, Animal cell culture skilling lab should be enriched with Tissue Engineering concepts and RDNA Technology.	Concepts of Tissue Engineering were incorporated and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Mr. Nikhil Reddy, Maryland, USA, For downstream processing, product enrichment operations should be added	Suggested topics were added and the same was approved by BoS and recommended to Academic council and the same was approved by BoS and recommended to Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Mr. Divyanshu Dhakate, Ottawa, Canada, Basic metabolic cycles can be added to Biology for Engineers course	Biology for engineers has been enriched with suggested topics	B.Tech	2021-2022	Biotechnology	19/05/2021

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Alumni	Miss. Kamujula Vandana, Ottawa, Canada, Emphasis on internships abroad can be enhanced	Students will be given more opportunities once COVID restrictions ends with international travel and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Mr. Nizamuddin Syed, Sydney, Australia Students should be encouraged to participate in National level seminars	Students will be allowed to participate in various national events	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Mr. Mohd. Anjum, Kaulalampur, Malaysia Visiting CSIR labs will be beneficial for students in their projects.	Students will be encouraged to visit CSIR labs with proper permissions and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Alumni	Miss. Vyshnavi Davulri, South Carolina, USA, Suggested to increase foreign language courses from second year itself	One foreign language is proposed to be introduced from Y20 batch and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021


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Students	Miss. Bhavana, To cover the core topics of the GATE syllabus in the Curriculum	As per the suggestions of BoS panel members many topics related to the GATE curriculum have been incorporated as Technical Proficiency and Training courses 1 and 2.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Mr. Salman Khan, Types of indices such as B Tree, B plus Tree, and Query processing can be added to Database management course	Suggested topics were added and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Miss. Pushpa, Genetic manipulations of ESCs, and homologous recombination of stem cells can also be incorporated in Stem cell Technology course.	Concepts of ESCs were added to course Stem cell technology and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Mr. Srinivas Bandi, Allows the students to go for more industrial tours to explore manufacturing of various products	A number of industrial tours will be increased as per suggestion and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Miss. Suhana Kousar, A course like Biomaterials can be introduced in the Medical specialization	Biomaterials will be floated in the medical specialization as per the suggestions and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Students	Miss. Afeefah Farheen, New courses like CADD can be added to Bioinformatics specialisation	Suggested topics were added and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Mr. Suresh Kancham, Suggested to increase the number of industrial visits	A number of industrial tours will be increased as per suggestion and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Mr. Naveen Poturi, Intellectual property rights can be added as one of the elective courses	Suggested topics were added and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Miss. Rachel Kocherla, Advised to introduce lab for professional elective courses as well	Labs for professional courses have been introduced and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Students	Miss. Sunandini Vedigandla, Suggested implementing "Industrial Visit" program for any food-related industries	An industrial visit has been planned and incorporated into Y20 and Y19 students for any nearby food industries.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Parents	Mr. Hussain Shaikh, Students job oriented courses to be implemented	Technical Proficiency and Training 1 & 2 have been implemented with an industrial curriculum	B.Tech	2021-2022	Biotechnology	19/05/2021
Parents	Mr. Chandrasekhar suggested introducing NGS and RNA sequences like courses for Bioinformatics specialization	The suggested course were added and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Parents	Mr. Subhash Pal To enhance the practical knowledge of students by increasing lab experiments	As per the suggestions, a number of experiments have been improved and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Parents	Mrs. Sukanya Vemuri Conduct more hands-on experiments and allow students to do more lab work	As per the suggestions, a number of experiments have been improved and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021
Parents	Mrs. Fareeha Shaikh Encourage abroad internship for students who have good academic record	Students will be given more opportunities once COVID restrictions ends with international travel and the same was approved by BoS and recommended to the Academic council.	B.Tech	2021-2022	Biotechnology	19/05/2021

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Parents	Mr. Jonnalgadda Vinay's Conduction of more skill-based experiments	As per the suggestions, a number of experiments have been improved approved by BoS, and eventually recommended to the Academic council.	B.Tech	2021- 2022	Biotechnology	19/05/2021
Parents	Mr. Umesh Raj's Lectures from Industrial experts should be improved for learning skills	Lectures from Industrial experts have been introduced approved by BoS and eventually recommended to the Academic council.	B.Tech	2021- 2022	Biotechnology	19/05/2021
Parents	Mrs. Siddiqua Begum's Series of foreign lectures could be increased for proper skills	As per the suggestion, foreign lectures will be increased approved by BoS, and eventually recommended to the Academic council.	B.Tech	2021- 2022	Biotechnology	19/05/2021
Parents	Mr. Saleem Khan Suggested to include Foreign internships from second year on words	Students will be given more opportunities once COVID restrictions ends with international travel approved by BoS and eventually recommended to the Academic council.	B.Tech	2021- 2022	Biotechnology	19/05/2021
Parents	Mr. J Vinay, Lectures from Eminent people should be improved for students	Lectures from Eminent people have been planned for courses approved by BoS and eventually recommended to the Academic council.	B.Tech	2021- 2022	Biotechnology	19/05/2021

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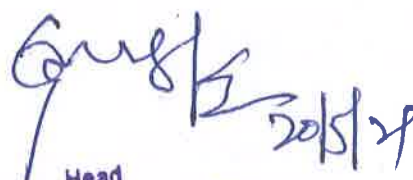
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Annexure-V: Pre Ph.D Courses

S.NO.	COURSE CODE	NAME OF THE COURSE	PAPER NUMBER
1	21BT201	Bioanalytical Techniques	PAPER-2
2	21BT202	Plant Biotechnology	PAPER-3
3	21BT203	Genetic Engineering	PAPER-3
4	21BT204	Microbial Technology	PAPER-3
5	21BT205	Biochemistry	PAPER-3
6	21BT206	Molecular Modelling and Drug Design	PAPER-3
7	21BT207	Bioprocess Engineering	PAPER-3
8	21BT208	Immunotechnology	PAPER-3


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Koneru Lakshmaiah Education Foundation
(Deemed to be University)
VADESWARAM, Guntur Dt.



Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA

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Course Code: OEBT0002

Course Title: BIOMATERIALS

L-T-P-S: 3-0-0-0

Credits:3

Course Rationale: The course rationale for a biomaterials course with a focus on employability is to provide students with a comprehensive understanding of biomaterials and their applications in various industries, while also equipping them with the skills and knowledge needed to pursue successful careers in the field.

Course Objective: The course objective aims to provide students with a well-rounded education in biomaterials, preparing them for various career paths and opportunities within the field.

COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
C01	Apply Biomaterials Principles and applications in Biotechnology	PO3	3
C02	Compare Classifications and Behaviour of Different Types of Biomaterials and Bio-based materials designed Product for Various Biomedical Applications	PO4	3
C03	Assess the challenges in the in vitro and in vivo evaluation of biomaterial biocompatibility	PO4,PSO1	3
C04	Develop various strategies to Design Organ Regeneration Products	PO11, PSO1	3

Syllabus

Introduction to biomaterials, Native Tissue Organization, Biomaterial-Tissue interaction, Biomaterial-blood interaction, Analytical Tools in Biomaterial research - scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction spectroscopy (XRD), Swelling, Degradation, Mechanical properties of Biomaterials. Biomaterial Types: Metals, Bioceramics, Polymers, Composites, Oxygen releasing biomaterials, Stimuli-responsive Biomaterials, Hydrogels, Decellularized Matrix, Cells, Bio fabrication Process, 3D/4D/5D printing technology. Biological properties of Biomaterials, Biofilms, Ant biofilm strategies,

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biological tools in Biomaterial research, In vivo testing of Biomaterials. Wound healing Biomaterials, Orthopedic Biomaterials, Cartilage Biomaterials, Cardiovascular Biomaterials, Bioreactors, Drug delivery application, Biomedical and biosensors, Problems and possible solutions in implant fixation; Failure analysis of medical devices and implants.

Text Books:1) Biomaterials Science: An Introduction to Materials in Medicine Hardcover -by Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons.
2) Biomaterials Science: An Introduction to Materials in Medicine, Buddy Ratner, Allan Hoffman, Frederick Schoen, Jack Lemons.

Signature

BOS Chairman

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Course Code: OEBT0003

Course Title: COMPUTER AIDDED DRUG DESIGN

L-T-P-S: 3-0-0-0

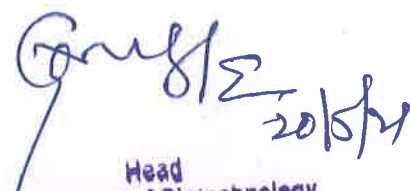
Credits: 3

Course Rationale: The course in Computer-Aided Drug Design enhances students' employability by equipping them with the specialized knowledge and skills needed to contribute effectively to the drug discovery process and excel in roles that require a strong understanding of both biology and computational methods.

Course Objective: The course objectives aim to equip students with a strong foundation in computational methods for drug design, preparing them for careers in pharmaceutical research, biotechnology, academia, and related fields.

COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	To apply Computer-Aided Drug Design methods and its importance in drug discovery	PO1	3
CO2	To apply the concepts of database mining for macromolecular targets and small molecules for their structural interactions.	PO5	3
CO3	To apply common methods involved in Computer-aided drug design including structure modelling, bio molecular interactions, virtual screening, QSAR, and ADMET properties	PO1	3
CO4	To apply the concepts of drug design in real word scenarios, pitfalls and scope of Computer-aided drug design	PO1,PO2,PO3, PO4,PO5	3


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Syllabus

INTRODUCTION TO COMPUTER-AIDED DRUG DESIGN: Drug Definition, history, and types, Overview of drug discovery and development (Roadmap and timeline to new medicine development, Approaches to drug development by Random Screening, Chemical Modification, and Rational design), Methodologies and strategies in CADD, Drug targets in Diseases, Phases of Computer-aided drug design (Target Discovery), Phases of Computer-aided drug design (Lead Discovery), Bimolecular interactions (Concepts of molecular docking and binding mechanisms, structure, and Ligand Based docking, Workflow of molecular docking, Scoring functions and analysis of interactions), Importance of Computer-aided drug design with case examples. **DATABASES AND INFORMATION MINING:** Introduction to biological databases, Demonstration of common biological databases (NCBI, ExPasy, PDB, Pubchem, Drugbank), Information retrieval from biological databases, Introduction to macromolecular structure databases (Introduction to protein Data bank, Structure formats, Understanding the experimental parameters of a structure), Small molecule databases and drug banks (Introduction to PubChem database, Small molecule search with defined formats), Therapeutic and pharmacogenomics databases (Target dB, Pharm GKB), Drug-target interaction databases (ChEMBL, ChemSpider), Pathway database for drug targets (String and KEGG Drug pathways, Drugbank) **METHODS IN COMPUTER-AIDED DRUG DESIGN.** Sequence analysis of biomolecules (Sequence retrieval methods, Sequence formats, and manipulation), Protein property analysis and predictions (Sequence-based property and structural analysis of proteins), Structural analysis and visualization of proteins (Visualization of proteins (secondary structure, surfaces, Hydrophobicity, charge), Modelling of proteins concepts and examples (Common methods and algorithms in protein modelling and its applications), Small molecule analysis for physicochemical properties (Calculation of physicochemical properties and applications), Small molecule retrieval and similarity search (Retrieval of small molecules in databases with similarity parameters), Fundamentals of molecular docking and scoring (Methods of molecular docking and scoring), Concept of ADMET property of compounds (Rules of ADMET properties of compounds and importance) **APPLICATIONS AND SCOPE OF CADD:** Fundamentals of Molecular dynamics simulations (History and applications, algorithms and scoring), concepts of high throughput virtual screening in drug discovery (Importance, Applications, Methods, and workflow), Introduction to chemical pharmacophore and its importance in drug design, Introduction to Quantitative structure-activity relationships in drug design, Principles of Pharmacogenetics and tailored made medicines, Application of Computer-aided drug design with real-world examples (Case example of CADD in Cancer drug Discovery and HIV infections), Scope of Computer-aided drug design in future (Current limitations and Search for improved methods

Text Books: 1. Molecular modelling basic principles and applications -Hans-Dieter Holtje and Gerd Folkera, Wiley. 2003.

2. Molecular modelling of proteins. By Andreas Kukol, Humana Press, 2008.



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Course Code: 21BT3079

Course Title: NGS SEQUENCING AND DATA ANALYSIS

L-T-P-S: 3-0-0-0

Credits: 3

Course Rationale: Students can develop a strong foundation in NGS technologies and data analysis, positioning themselves for rewarding and impactful careers in the rapidly advancing field of genomics and molecular biology.

Course Objective: the course aims to equip students with the skills and knowledge necessary to effectively utilize NGS technologies and analyse the vast amounts of data generated, making them highly employable in various fields related to genomics, molecular biology, and bioinformatics.

COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
C01	Gain a comprehensive understanding of different NGS sequencing technologies, including Illumina, Ion Torrent, and PacBio.	PO1	3
C02	Develop proficiency in handling raw sequencing data, including quality control, filtering, and pre-processing steps.	PO3	3
C03	Learn methods for identifying and annotating genomic variants, including single nucleotide polymorphisms (SNPs) and insertions/deletions (indels).	PO2,PO4	3
C04	Explore techniques for functional genomics analysis, including transcriptomics (RNA-Seq) and epigenomics (ChIP-Seq, DNA methylation).	PO3	3

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Syllabus

Introduction to NGS Technologies and Workflows: Overview of NGS technologies and platforms, Library preparation methods: DNA and RNA, Sequencing chemistries and data generation, Quality control, and data pre-processing. Bioinformatics Fundamentals: Introduction to bioinformatics and computational biology, Command-line basics and data manipulation, Introduction to bioinformatics software and tools, NGS Data Analysis Pipeline: Sequence alignment and mapping, Variant calling and annotation, Data visualization and interpretation, Transcriptomics Analysis: RNA-Seq data processing and analysis, Differential gene expression analysis, Alternative splicing analysis, Epigenetics and DNA Methylation Analysis: Introduction to epigenetics and DNA methylation, Analyzing DNA methylation data, Integrating epigenetic data with gene expression data, Metagenomics and Microbiome Analysis: Introduction to metagenomics and microbiome studies, Processing and analyzing metagenomic data, Functional profiling and taxonomic classification, Single-cell RNA-Seq analysis, CHIP-Seq data analysis, Long-read sequencing technologies, (PacBio, Oxford Nanopore), Introduction to cloud computing and NGS data storage

Textbook:

1. Bioinformatics Data Skills by Vince Buffalo

References: 1. Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids" by Richard Durbin et al.

2. Bioinformatics Algorithms: An Active Learning Approach" by Phillip Campeau and Pavel Pevzner.

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Course Code: 21UC3105

Course Title: PROBLEM-SOLVING SKILLS-I

L-T-P-S: 0-0-6-0

Credits: 1.5

Course Rationale: In today's complex and rapidly changing world, the ability to effectively solve problems is a critical skill for success in both personal and professional endeavors. Problem-solving skills go beyond simply finding solutions; they encompass critical thinking, creativity, decision-making, collaboration, and effective communication. This course aims to equip students with a strong foundation in problem-solving techniques and strategies, enabling them to approach challenges with confidence, adaptability, and a systematic approach.

Course Objective: The "Problem-Solving Skills-I" course aims to empower students with the fundamental skills and mindset needed to tackle a wide range of challenges, both in academic and real-world settings. Through a combination of theoretical concepts, practical applications, and experiential learning, students will develop into resourceful problem solvers capable of navigating complexity and uncertainty.

Syllabus

Critical Thinking and Analytical Skills: Definition and importance of critical thinking, Elements of critical thinking: analysis, evaluation, inference, explanation, and interpretation, Identifying and evaluating assumptions, Recognizing and avoiding logical fallacies, Problem analysis techniques.

Creative Problem Solving: Understanding creativity and its role in problem-solving, Techniques for generating creative ideas: brainstorming, mind mapping, lateral thinking, Overcoming creative blocks, Applying creativity to real-world problems.

Decision Making: Types of decisions: routine, strategic, tactical, Decision-making process: defining the problem, gathering information, evaluating options, making a decision, implementation, and review, Rational decision-making model Intuitive decision-making, Ethical considerations in decision-making

Problem-Solving Strategies: The importance of having a systematic approach, Steps in problem-solving: problem identification, problem analysis, solution generation, solution implementation, and evaluation, Techniques for defining problem boundaries, Root cause analysis

Text Books: 1. "Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley and David Kelley

2. "Smart Choices: A Practical Guide to Making Better Decisions" by John S. Hammond, Ralph L. Keeney, and Howard Raiffa

3. "Critical Thinking: The Nature of Critical and Creative Thought" by Dr. Carrol L. Henderson

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Course Code: 21UC3206

Course Title: PROBLEM-SOLVING SKILLS-II

L-T-P-S: 0-0-6-0

Credits: 1.5

Course Rationale: In today's complex and rapidly changing world, the ability to effectively solve problems is a critical skill for success in both personal and professional endeavors. Problem-solving skills go beyond simply finding solutions; they encompass critical thinking, creativity, decision-making, collaboration, and effective communication. This course aims to equip students with a strong foundation in problem-solving techniques and strategies, enabling them to approach challenges with confidence, adaptability, and a systematic approach.

Course Objective: The "Problem-Solving Skills-II" course aims to empower students with the fundamental skills and mindset needed to tackle a wide range of challenges, both in academic and real-world settings. Through a combination of theoretical concepts, practical applications, and experiential learning, students will develop into resourceful problem solvers capable of navigating complexity and uncertainty.

Syllabus

Advanced Critical Thinking and Analysis: Review of Critical Thinking Concepts from Problem Solving Skills-I, Advanced elements of critical thinking: deduction, induction, abstraction, and pattern recognition, Cognitive biases and their impact on decision-making, Meta-cognition and self-awareness in critical thinking, Application of advanced critical thinking to complex problems.

Advanced Decision-Making Strategies: Advanced decision-making models: Prospect Theory, Bounded Rationality, and Vroom-Yetton-Jago Model, Multi-criteria decision analysis and decision matrices, Game theory and its relevance in decision-making, Addressing uncertainty and risk in decisions: Decision Trees and Monte Carlo Simulation, Ethical considerations and ethical decision-making frameworks.

Systems Thinking and Problem Analysis: Introduction to systems thinking and its role in problem-solving, Systems dynamics, and causal loop diagrams, Feedback loops and their impact on problem-solving, Root cause analysis techniques: 5 Whys, Fishbone (Ishikawa) Diagrams, Identifying and managing interdependencies in complex problem-solving.

Advanced Creative Problem Solving and Innovation: Advanced brainstorming techniques: Reverse Brainstorming, SCAMPER, and Forced Connections, Design thinking principles and human-centered problem-solving, Ideation and concept development: Prototyping and rapid experimentation, Overcoming resistance to change and fostering a culture of innovation, Integrating creativity with analytical thinking in problem-solving

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