



Koneru Lakshmaiah Education Foundation

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Campus: Green Fields, Vaddeswaram - 522 502, Guntur District, Andhra Pradesh, INDIA.

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XXIII ACADEMIC COUNCIL-ANNEXURE A4

Date: 21/05/2018

DEPARTMENT OF BIOTECHNOLOGY MINUTES OF XXIII BOARD OF STUDIES MEETING

The Department Board of Studies meeting was conducted on 21/05/2018 at C501 from 10:00 AM to 12:30 PM for which Dr.K Shrinivasulu, HoD-BT, was the chair.


The following members were present for XXIII BoS meeting

1. Dr.K Shrinivasulu, Professor, HoD-BT, Chairman
2. Dr.G Satyanaraya, Professor, IIT-Madras, External Member
3. Dr.A Uma, Professor, JNTU-Hyderabad, External Member
4. Dr.R Satish Babu, Assoc.Professor, NIT-Warangal-External Member
5. Dr.M Lakshmi Prasad, Managing Director, Sujay Biotech-External Member
6. Dr.Y Srinivasa Reddy, Director, Sajjala Biotech-External Member
7. Dr.V Aruna, Sr.Scientist, Monsanto India Limited-External Member
8. Dr.V.Praveen Kumar, Assoc.Professor, Deputy HoD
9. Dr.K.Giridhar, Assoc.Professor, Member
10. Dr.R Srinivasa Reddy, Assoc.Professor, Member
11. Dr.JayaKumar Singh, Professor, Member
12. Dr.V Bhadra Moorthy, Assoc.Professor, Member
13. Dr.BVLS Prasad, Professor, Member
14. Dr.M.Sudhamani, Assoc.Professor, Member
15. Dr.M.Maheswara Reddy, Asst.Professor, Member
16. Dr.G.Siva Reddy, Asst.Professor, Member
17. Dr.M S R Krishna, Asst.Professor, Member
18. Dr.Nadeem Siddiqui, Assoc.Professor, Member
19. Dr.Sarada Prasanna Mallick, Asst.Professor, Member

Member's absent-NIL

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

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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AGENDA and RESOLUTIONS

AGENDA ITEM-I

To consider and approve the curriculum for the 2018-19 admitted batch of B.Tech & M.Tech and the minor changes proposed in the curriculum of the 2017-18 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 2018-19 B.Tech & M.Tech and the minor changes proposed in the curriculum of 2017-18 admitted batches have been approved by BoS members and recommended to the Academic Council. Course structure of 2018-19 and 2017-18, 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 2018-2019 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 2018-19, 2017-18 admitted batches have been approved by BoS members and recommended to the Academic council. Syllabi of 2018-19 and 2017-18 batches have been furnished in **(Annexure: II)**.

AGENDA ITEM-III

To consider and approve the resolutions made by XXIII DAC conducted on 20 th May 2018.	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 the 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 2018-19 batch of admitted students

Approved and recommended to Academic Council

The following is the feedback given by stakeholders on the curriculum

- ❖ Dr. Rajesh, Scientist E, Sanofi Biotech, Medchal, Telangana, has given feedback to add SKE-II (Process Engineering Tools) course for 2018-2019 curriculum. Upon discussion, the resolution was passed and recommended to the academic council for approval of the new course.
- ❖ Dr. Alok Kumar, Sanofi Biotech, Medchal, Telangana, has given feedback to include SKE-3 (Animal cell culture) course for 2018-2019 curriculum. Upon discussion the resolution was passed and recommended for the academic council for approval of the new course.
- ❖ Dr. Easwaran, Biocon Research Academy, Bangalore, has given feedback to incorporate SKE-4 (Advanced instrumentation) course for the 2018-2019 curriculum. Upon discussion, the resolution was passed and recommended for the academic council for approval of the new course.
- ❖ Dr. Sirsendu Ray, NIT Rourkela, has given feedback to incorporate Technical Skills-I (Coding) in the 2018-19 curriculum. Upon discussion the resolution was passed and recommended for the academic council for approval of the new course.
- ❖ Dr. Indrani, Research Head, Unique Biotech Pvt.ltd, Hyderabad, Telangana, has given feedback to include Bernoulli's equation and hydrodynamic methods in the subject Transport Process in Biological systems. Upon discussion, the resolution was passed and recommended for the academic council.
- ❖ Dr. Amit Srivastava, IIT BHU, UP, has given feedback to incorporate Technical skills-2 (Coding) in the 2018-19 curriculum. Upon discussion, the resolution was passed and recommended for the academic council for approval of the new course.


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- ❖ Mr. Naresh Varma, Hetero Drugs, has given feedback to include concepts like cloning of PCR products in the Genetic Engineering course. Upon discussion, the resolution was passed and recommended for the academic council.
- ❖ Ms. V. Sravya, Biocon Bangalore, has given feedback to incorporate topics like heteropolysaccharides in Biochemistry. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Ms. Satya Madhuri B, Amazon Hyderabad Suggested including Energy balance concepts in Process engineering principles. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Mr. B.Mahesh, Dr.Reddy's Laboratories Pvt ltd Hyderabad Advised to add Medical Lab Technology in curriculum for 2018-19. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Ms. Bhavana P, Recommended adding staining techniques in Microbiology. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Ms. Sarvani Vemuri, Suggested enriching the syllabus following industrial needs. Upon discussion the resolution was passed and recommended to academic council.
- ❖ Mr. Sibin Recommended altering the LTP structures for courses like Indian Heritage & culture and Indian Constitution and these courses to be offered as audit courses. Upon discussion the resolution was passed and recommended to academic council.
- ❖ Ms. Lasya V, Recommended to add Phylogenetic analysis in Bioinformatics. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Ms. Yochana Advised to include Temperature dependency for rate of reaction in Biochemical Reaction Engineering. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Mr. Shaikh Khaja Recommended to add peptide hormones and biodegradable plastics in Plant and animal Biotechnology. Upon discussion, the resolution was passed and recommended for the academic council.


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- ❖ Mr. Satyanarayana Rao, Telangana, Advised to include isotopic techniques in Bioanalytical Techniques. Upon discussion the resolution was passed and recommended for the academic council.
- ❖ Ms. Sravanthi Naidu, Vijayawada, Suggested adding concepts such as Media optimization techniques in Fermentation Technology. 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 July-2018 admitted batch of Ph.D	Approved and recommended to Academic Council
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RESOLUTION: Pre Ph.D. courses and syllabi for July-2018 admitted batch of Ph.D have been approved by BoS members and recommended to the Academic council and the corresponding proofs have been attached in **Annexure -V**.

AGENDA ITEM-VI

To consider and approve the list of skill development, Engineering Science and basic science courses introduced for 2018-2019 admitted batch.	Approved and recommended to Academic Council
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DISCUSSION:

- ❖ Considering the valuable input from Dr. Gummadi Satyanarayana, Professor from IIT Madras, Chennai, Tamilnadu, and the choice was made to integrate a course entitled "**Workshop Practices for Biotechnologists**" into 2018-2019 curriculum. After a comprehensive discussion in the Board of Studies meeting, the resolution was approved and proposed to the academic council for the ultimate endorsement, signifying a noteworthy enhancement to the curriculum by replacing with "Workshop Practices for Biotechnologists" in place of "Basic Engineering Measurements". The included course has been equipped with experiments which are the basic needs of biotechnology and pharma sectors.


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- ❖ In response to the feedback received from Dr. B Sridhar, Professor, IIT Hyderabad, and Telangana. The choice was made to incorporate "**Engineering Graphics and Design for Biotechnologists**" into the 2018-19 curriculum. After an extensive discussion, the resolution successfully passed, and the proposed course was recommended to the academic council for the ultimate approval. Various tools such as image J, EDS, X-pert High Score etc. have been introduced, which are very much useful in Tissue remodelling Design for Biotechnologists. Hence, Engineering Mechanics has been replaced with Engineering Graphics & Design for Biotechnologists.
- ❖ Upon the guidance provided by Dr. K Kubendran, Professor, Anna University, Chennai, Tamilnadu, the decision was taken to integrate "**Entrepreneurship**" into the curriculum for the academic year 2018-19. Following an in-depth discussion, the resolution passed successfully and the same was proposed to academic council for the ultimate approval in order to inculcate Entrepreneurship skills in students.
- ❖ Upon the advice received from Mr. B. Mahesh from Dr. Reddy's Laboratories Pvt Ltd, Hyderabad, a decision was made to incorporate **Skilling for Engineers-I (Medical Lab Technology)** into the curriculum for the academic year 2018-19. Following a thorough discussion, the resolution was successfully passed and recommended to the academic council for final approval. Methodologies in Disease diagnosis and prognosis has been introduced in the Medical Lab Technology which was replaced with Medical coding.
- ❖ Upon the valuable feedback from Dr. Rajesh, Scientist E at Sanofi Biotech in Medchal, Telangana, and the decision was made to include the **Skilling for Engineers-II (Process Engineering Tools)** course in the 2018-2019 curriculum. Following thorough discussion, the resolution gained approval and recommended to the academic council for final approval of this new and significant addition to the curriculum. Various process parameters related to industrial processes like pH, Viscosity, Turbidity and specific gravity etc. have been introduced, which are very much useful in Industrial applications and thus, Instrumentation has been replaced with Process Engineering Tools.

22/11/18
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- ❖ Upon receiving valuable feedback from Dr. Alok Kumar at Sanofi Biotech in Medchal, Telangana, the decision was made to incorporate the **Skilling for Engineers-III (Animal Cell Culture)** course into the 2018-2019 curriculum. Following a comprehensive discussion, the resolution was successfully passed and is now recommended to the academic council for final approval of this new and impactful addition to the curriculum. Components such as Sterilization, passaging, and Trypsinization were added in Animal cell culture which are useful in aseptic Cell culture maintenance. Hence, plant molecular biology has been replaced with Animal cell culture.
- ❖ In response to feedback provided by Dr. Easwaran from Biocon Research Academy in Bangalore, the decision was made to integrate the **Skilling for Engineers-IV (Advanced Instrumentation)** course into the 2018-2019 curriculum. Following a thorough discussion, the resolution successfully passed, and the new course is now recommended to the academic council for final approval. Various advanced techniques such as GCMS, HPLC and Bio-printing etc. have been introduced, which are very much useful in analysing the quality of a biological sample. Hence, Analytical techniques has been replaced with advanced instrumentation.
- ❖ Upon receiving feedback from Dr. Sirsendu Ray at NIT Rourkela, the decision was made to include **Technical Skills-I (Coding)** in the 2018-19 curriculum. Following a comprehensive discussion, the resolution was successfully passed and is now recommended to the academic council for final approval of this new and valuable addition to the course offerings. Various tools such as R programming, PERL etc. have been introduced, which are very much useful in analysing biological sample. Hence, coding skills for Engineers has been replaced with Technical Skills-I (Coding).
- ❖ In response to feedback provided by Dr. Amit Srivastava at IIT BHU, UP, the decision was made to integrate **Technical Skills-2 (Coding)** into the 2018-19 curriculum. Following a thorough discussion, the resolution successfully passed, and the new course is now recommended to the academic council for final approval. Tools like Python, QSAR (Quantitative structure activity relationship) have been introduced,

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which are very much useful in predicting antigenic determinants for drug design. Hence, coding skills for Engineers has been replaced with Technical Skills-II (Coding)

RESOLUTION: Upon discussion, all the BOS members approved the incorporation of the following skill development and basic science courses into the curriculum from the Academic Year 2018-2019 which improves the skill set of students in animal cell culture, advanced instrumentation and to learn the aspects of quality control concerning value added products by learning workshop practices for Biotechnologists. In addition, tools for Tissue remodelling using 3D/4D Bioprinting techniques can be known by Design for Biotechnologists. Further, Students will be able to gain the skills in Entrepreneurship.

1. Workshop practices for Biotechnologists
2. Engineering Graphics & Design for Biotechnologists
3. Entrepreneurship
4. Skilling for Engineers-I (Medical Lab Technology)
5. Skilling for Engineers-II (Process Engineering Tools)
6. Skilling for Engineers-III (Animal cell culture)
7. Skilling for Engineers-IV (Advanced Instrumentation)
8. Technical Skills-I (Coding-I)
9. Technical Skills-II (Coding-II)

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

Shetty
Head 5/1/18

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The following members have attended the XXIII Board of studies (BOS) meeting held on 21/05/2018 at C501 from 10:00 am to 12:30 pm.

S.No	FULL NAME	DESIGNATION	ORGANIZATION	POSITION IN THE MEETING	SIGNATURE
1	Dr.G Satyanaraya	Professor	IIT-Madras	External-Academic Peer	
2	Dr.A Uma	Professor & HOD	JNTU Hyderabad	External-Academic Peer	
3	Dr.R Satish Babu	Assoc. Professor	NIT-Warangal	External-Academic Peer	
4	Dr.M Lakshmi Prasad	Managing Director	Sujay Biotech	External-Industry Peer	
5	Dr.Y Srinivasa Reddy	Director	Sajjala Bio labs	External-Industry Peer	
6	Dr.V Aruna	Sr.Scientist	Monsanto India Limited	External-Industry Peer	
7	Dr.K.Shrinivasulu	Professor & HOD	Biotechnology	Internal member	 21/5/18
8	Dr.V. Praveen Kumar	Alternate Head & Assoc. Professor	Biotechnology	Internal member	 21/5/18
9	Dr.K.Giridhar	Associate Professor	Biotechnology	Internal member	
10	Dr.R Srinivasa Reddy	Associate Professor	Biotechnology	Internal member	
11	Dr.Jaya Kumar Singh	Professor & Assoc. Dean	Biotechnology	Internal member	
12	Dr.V Bhadra Moorthy	Asst. Professor	Biotechnology	Special Invitee	
13	Dr.BVLS Prasad	Professor	Biotechnology	Internal member	

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14	Dr.M.Sudhamani	Assoc. Professor & Research Group Head	Biotechnology	Internal member	
15	Dr.M.Maheswara Reddy	Asst. Professor	Biotechnology	Special Invitee	
16	Dr.G.Siva Reddy	Asst. Professor	Biotechnology	Professor Incharge- Academics	
17	Dr.M S R Krishna	Asst. Professor-R Pac chairman	Biotechnology	Internal member	
18	Dr.Nadeem Siddiqui	Assoc. Professor	Biotechnology	Special Invitee	
19	Dr.Sarada Prasanna Mallick	Asst. Professor	Biotechnology	Special Invitee	
20	170010097- Md.Anjum	II nd Year	Biotechnology	Special Invitee	
21	170010098-Ms.N Kusuma	II nd Year	Biotechnology	Special Invitee	
22	180010049- Ms.Polladi Bhavana	1 st Year	Biotechnology	Special Invitee	
23	180010059- Ms.Vemuri Sarvani	1 st Year	Biotechnology	Special Invitee	
24	160010067-V Renuka	III rd Year	Biotechnology	Special Invitee	
25	160010037- Sreerama Chandra Karthik	III rd Year	Biotechnology	Special Invitee	
26	150010035-Poladi Bhavani	IV th Year	Biotechnology	Special Invitee	
27	150010067-S Balaji	IV th Year	Biotechnology	Special Invitee	

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

Sl. No	Course Code	Course Title	Category	L	T	P	S	Cr	CH	Pre-requisite	New Course/ Revised Course/ Retained Course	Changes Proposed by	Employability / Entrepreneurship / Skill Development
1	18UC1101	Basic English	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
2	18UC1202	English Proficiency	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
3	18UC2103	Professional Communication Skills	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
4	18UC2204	Aptitude Builder -1	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
5	18UC3105	Aptitude Builder -2	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
6	18UC3206	Campus to Corporate	HSS	0	0	4	0	2	4	Nil	Retained Course		EMPLOYABILITY
7	18UC0007	Indian Heritage and Culture*	HSS	2	0	0	0	2	2	Nil	Retained Course		EMPLOYABILITY
8	18UC0008	Indian Constitution*	HSS	2	0	0	0	2	2	Nil	Retained Course		EMPLOYABILITY
9	18UC0009	Ecology & Environment*	HSS	2	0	0	0	2	2	Nil	Retained Course		EMPLOYABILITY
10	18UC0010	Universal Human Values & Professional Ethics*	HSS	2	0	0	0	0	2	Nil	Retained Course		EMPLOYABILITY

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22/5/18

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		BS	3	0	0	0	0	0	0	3	3	3	Nil	Retained Course		EMPLOYABILITY
11	18SC1103	BS	3	0	0	0	0	0	0	3	3	3	Nil	Retained Course		EMPLOYABILITY
12	18SC1105	BS	0	0	2	0	1	2	0	1	2	2	Nil	Retained Course		EMPLOYABILITY
13	18SC1104	BS	0	0	2	0	1	2	0	1	2	2	Nil	Revised course	Industry Peers	EMPLOYABILITY
14	18MT2001	ES	3	0	0	0	3	0	3	3	3	3	Nil	Revised course	Industry Peers	EMPLOYABILITY
15	18MT2011	BS	2	1	0	0	3	1	0	3	3	3	Nil	Revised course	Industry Peers	EMPLOYABILITY
16	18CY1001	BS	3	0	2	0	4	2	0	4	5	5	Nil	Revised course	Industry Peers	EMPLOYABILITY
17	18PH1001	BS	3	0	2	0	4	2	0	4	5	5	Nil	Retained Course		EMPLOYABILITY
18	18SC1101	BS	3	0	2	0	4	2	0	4	5	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
19	18SC1202	ES	3	0	2	0	4	2	0	4	5	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
20	18BT1002	ES	0	0	4	0	2	4	0	2	4	4	Nil	New Course	Academic Peers	EMPLOYABILITY
21	18BT1003	ES	0	0	4	0	2	4	0	2	4	4	Nil	New Course	Industry Peers	EMPLOYABILITY
22	18ES2101	ES	2	1	0	0	3	1	0	3	3	3	Nil	Revised course	Academic Peers	EMPLOYABILITY
23	18ES2103	ES	3	1	0	0	4	1	0	4	4	4	Nil	Retained Course		EMPLOYABILITY

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Shreyas
22/5/18



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24	18ES2102	Transport processes in Biological systems	ES	3	0	0	2	0	0	4	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
25	18BT2105	Biochemistry	ES	3	0	0	2	0	0	4	5	Nil	Revised course	Industry Peers	EMPLOYABILITY
26	18BT2106	Microbiology	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
27	18BT2107	Bio analytical Techniques	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Industry Peers	EMPLOYABILITY
28	18BT2109	Immunology	PC	3	0	0	2	0	0	4	5	Nil	Retained Course		EMPLOYABILITY
29	18BT3110	Bioinformatics	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
30	18BT3111	Genetic Engineering	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Industry Peers	EMPLOYABILITY
31	18BT3112	Fermentation Technology	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
32	18BT3113	Biochemical Reaction Engineering	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Industry Peers	EMPLOYABILITY
33	18BT3201	Plant Biotechnology	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Industry Peers	EMPLOYABILITY
34	18BT3202	Downstream Processing	PC	3	0	0	2	0	0	4	5	Nil	Revised course	Academic Peers	EMPLOYABILITY
35	18BT1201	Cell Biology	PC	3	0	0	0	0	0	3	3	Nil	Retained Course		EMPLOYABILITY
36	18BT2108	Molecular Biology	PC	3	0	0	0	0	0	3	3	Nil	Retained Course		EMPLOYABILITY
37	18SC1106	Technical Skill - 1 (Coding)	SKE	0	0	0	0	0	6	1.5	6	Nil	Retained Course		SKILL DEVELOPMENT

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			SKE	0	0	0	0	6	1.5	6	Nil	Retained Course		SKILL DEVELOPMENT
38	18SC1207	Technical Skill - 2 (Coding)										Retained Course		SKILL DEVELOPMENT
39	18TS1001	Skilling for Engineers-1 (Medical Lab Technology)	SKE	0	0	0	0	8	2	8	Nil	Retained Course		SKILL DEVELOPMENT
40	18TS1002	Skilling for Engineers-2 (Process Engineering Tools)	SKE	0	0	0	0	8	2	8	Nil	Retained Course		SKILL DEVELOPMENT
41	18BT3150	Technical Proficiency & Training -1 (Genomics)	SKE	1	0	0	0	0	1	1	Nil	Retained Course		SKILL DEVELOPMENT
42	18TS1003	Skilling for Engineers-3 (Animal Cell Culture)	SKE	0	0	0	0	8	2	8	Nil	Retained Course		SKILL DEVELOPMENT
43	18BT3250	Technical Proficiency & Training-2 (Bio processing)	SKE	1	0	0	0	0	1	1	Nil	Retained Course		SKILL DEVELOPMENT
44	18TS1004	Skilling for Engineers-4 (Advanced Instrumentation)	SKE	0	0	0	0	8	2	8	Nil	Retained Course	Academic Peers	SKILL DEVELOPMENT
45	18IE2246	Industrial Training	PR	0	0	4	0	0	2	4	Nil	Retained course		SKILL DEVELOPMENT
46	18IE3247	Term paper	PR	0	0	4	0	0	2	4	Nil	Retained course		SKILL DEVELOPMENT
47	18IE4048	Project (Part I)	PR	0	0	0	24	6	24	24	Nil	Retained Course		SKILL DEVELOPMENT & ENTREPRENEURSHIP
48	18IE4049	Project (Part II)	PR	0	0	0	24	6	24	24	Nil	Retained Course		SKILL DEVELOPMENT & ENTREPRENEURSHIP

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49	18IE4050	Practice School	PR	0	0	0	0	0	24	24	Nil	Retained Course	SKILL DEVELOPMENT
50	18IE4051	Internship	PR	0	0	0	0	24	24	24	Nil	Retained Course	SKILL DEVELOPMENT
51	OE-1	Open Elective-1	OE	3	0	0	0	0	3	3	Nil	Retained Course	SKILL DEVELOPMENT
52	OE-2	Open Elective-2	OE	3	0	0	0	0	3	3	Nil	Retained Course	SKILL DEVELOPMENT
53	OE-4	Management Elective	OE	4	0	0	0	0	4	4	Nil	Retained Course	ENTREPRENEURSHIP
54	OE-5	Foreign Language	OE	4	0	0	0	0	4	4	Nil	Retained Course	EMPLOYABILITY
55	PE-1	PROFESSIONAL ELECTIVE-1	PE	3	0	0	0	0	3	3		Retained Course	EMPLOYABILITY
56	PE-2	PROFESSIONAL ELECTIVE-2	PE	3	0	0	0	0	3	3		Retained Course	EMPLOYABILITY
57	PE-3	PROFESSIONAL ELECTIVE-3	PE	3	0	0	0	0	3	3		Retained Course	EMPLOYABILITY
58	PE-4	PROFESSIONAL ELECTIVE-4	PE	3	0	0	0	0	3	3		Retained Course	EMPLOYABILITY
59	PE-5	PROFESSIONAL ELECTIVE-5	PE	3	0	0	0	0	3	3		Retained Course	EMPLOYABILITY
60	18GN1101	Counselling -I	CNS	0	0	1	0	0	0	1	Nil	Retained Course	EMPLOYABILITY
61	18GN1202	Counselling -II	CNS	0	0	1	0	0	0	1	Nil	Retained Course	EMPLOYABILITY
62	18BT3251	Molecular Genetics	PE	3	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
63	18BT3252	Transgenic Technology	PE	3	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY

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64	18BT3253	Molecular Expression Technology	PE	3	0	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
65	18BT3254	Genomics and Proteomics	PE	3	0	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
66	18BT4150	Molecular markers and Diagnostics	PE	3	0	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
67	18BT4151	Gene and the Environment	PE	3	0	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
68	18BT4152	Microbial Genetics	PE	3	0	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
69	18BT4153	DNA Forensics	PE	3	0	0	0	0	0	3	3	18BT3111	Retained Course	EMPLOYABILITY
70	18BT3255	Microbial Technology	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
71	18BT3256	Pharmaceutical Biotechnology	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
72	18BT3257	Metabolic Engineering	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
73	18BT3258	Bio resource Technology	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
74	18BT4154	Bioprocess Economics and Plant Design	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
75	18BT4155	Enzyme Engineering	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
76	18BT4156	Bioprocess Validation and cGMP	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
77	18BT4157	Food Technology	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY

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78	18BT4158	Pharmacovigilance and Safety	PE	3	0	0	0	0	0	3	3	18BT2106	Retained Course	EMPLOYABILITY
79	18BT3259	PERL and Bioperl programming	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
80	18BT3260	Biomedical Informatics	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
81	18BT3261	Molecular Modelling and Drug Design	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
82	18BT3262	Structural Biology	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
83	18BT4159	Systems Biology	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
84	18BT4160	Applied Bioinformatics	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
85	18BT4161	Data Base Management System	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
86	18BT4162	Python and R Programming	PE	3	0	0	0	0	0	3	3	18BT3110	Retained Course	EMPLOYABILITY
87	18BT3263	Stem cell technology	PE	3	0	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
88	18BT3264	Healthcare Biotechnology	PE	3	0	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
89	18BT3265	Cancer Biology	PE	3	0	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
90	18BT3266	Neurobiology	PE	3	0	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
91	18BT4163	Bioelectronics & Biosensors	PE	3	0	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
92	18BT4164	Tissue Engineering	PE	3	0	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY

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93	18BT4165	Virology	PE	3	0	0	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
94	18BT4166	Nano biotechnology	PE	3	0	0 <td>0</td> <td>0</td> <td>3</td> <td>3</td> <td>18BT1201</td> <td>Retained Course</td> <td>EMPLOYABILITY</td>	0	0	3	3	18BT1201	Retained Course	EMPLOYABILITY
95	18UC0011	Entrepreneurship	OE	2	0	0 <td>0</td> <td>0</td> <td>2</td> <td>2</td> <td>Nil</td> <td>New Course</td> <td>EMPLOYABILITY</td>	0	0	2	2	Nil	New Course	EMPLOYABILITY

Percentage of Syllabus Revision = $(17/61) * 100 = 28\%$

Percentage of Courses focusing on Employability = $(44/61) * 100 = 72.13\%$

Percentage of Courses focusing on Entrepreneurship = $(3/61) * 100 = 4.9\%$

Percentage of Courses focusing on Skill Development = $(14/61) * 100 = 22.95\%$

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Annexure II: Course wise Syllabus revision of approved structure as mentioned in the above Annexure I.

Course code	Course Title	Course Category	Existing Syllabus	New Syllabus	Topics added/Removed/Replaced	Changes in Course Outcomes	Justification for the modifications	Revision (%)
18ES2101	Process Engineering Principles	ES	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EX2ie-bZKF1AomopZeRltDcBSCyFiCx6kM9p-H_Q0o6BAQ?e=ttds8n	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EXwSLZCGyIIrcHkEbjiYC4BuA0_gpOLqavhtDZLvvmBDQ?e=hRDLY6	Energy balance worked examples without reaction: cooling in downstream processing, continuous water heater, and fermentation energy balance.	CO4	As per the feedback received from the stakeholders, we have revised the syllabus for the 2018-19 batch.	15%
18ES2102	Transport processes in Biological systems	ES	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EZhKVeQ_EbbVAsqGOWy7bUfgBf5QHjzkzfs-50HjlmviDig?e=1FHmCb	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/Eegjh6Tm4ZhOo9EWY59vE8UB4AmnVtV01iySAHjpB9johQ?e=7lvPoh	Hydrodynamic methods- orifice and venturi meter, weirs, Rotameters	CO1	As per the feedback received from the stakeholders we have revised the syllabus for the 2018-19 batch.	10%

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18BT2105	Biochemistry	ES	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/ERninzCxSlxlrqUrSLfCz8BCNt5OnG_obrc0TUyahAAMg?e=0UvSCP	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EcvTv6T0lqKpZsl8YRzuM0B-Dar4pQQfKQchrl36SoP3Q?e=zdvuVq	heteropolysaccharides (hyaluronic acid and chondroitin sulphate)	CO1	As per the feedback received from the stakeholders we have revised the syllabus for the 2018-19 batch.	5%
18BT2106	Microbiology	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EbSVuGwehrrpAucJrYTxifNQB7U-aBjl3Te6L-dli5Jliddg?e=1kMfSY	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/Ebob9o8uAzFEjNkFNQCRz4QBK1ROsnlaT0j0eNn3p02_bw?e=311dET	Identification based on shape, staining reactions (Differential stain, Acid fast, capsule staining, Endospore staining)	CO2	As per the feedback received from the stakeholders, we have revised the syllabus for the 2018-19 batch.	10%
18BT2107	Bio analytical Techniques	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EYxvnK4DKyLgCgh2wpbls4B7hob2uZ24QrirhC1sA0l4w?e=lwXhKM	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/Eba2hkB7dGhMl23DZbJtv0BpGvQ2-HfUjZoEsiN4Eppia?e=5CjgHx	Isotopic techniques	CO4	As per the feedback received from the stakeholders we have revised the syllabus for the 2018-19 batch.	15%

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18BT3110	Bioinformatics	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EcsVexEM42VKsh8JlUXDpOYBoP88MmnyExG0E2-EnhjSgA?e=Oopp8a	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/ERU3DRCPxTBKkk119MhIcWbu7SXRPPBH89myg6uFhR11A?e=qbmEYc	PHYLOGENETIC ANALYSIS	CO3	As per the feedback received We have revised the syllabus for the 2018-19 batch from the stake holders.	10%
18BT3111	Genetic Engineering	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EU0OsgqjbEFLhyqaopE8YWEbu2ojjPXjiBau4Omv0df0YA?e=UVlvtf	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EY8jxFqpXWFFluYwKDTewZWgBOHVU_TehLbcWDaxfdrhQ?e=VlsYSE	Cloning of PCR products, Multiplex PCR, Anchored PCR, Asymmetric PCR, Nested PCR, Inverse PCR, fusion PCR, RAPD-PCR, RT-PCR, Hot Start PCR	CO2	As per the feedback received from the stakeholders, we have revised the syllabus for the 2018-19 batch.	15%
18BT3112	Fermentation Technology	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EenjPDfPMxKm48AhZS7aREB1v0pEclU1ktlic54ItODzgz?e=dVF2AV	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EaDIX0blDRROvNqLmZuPHVkBZLMMWQ0kP4Z5souDhFuXmg?e=I0DByn	Methods of media optimization (Onefactor method and Plackett-Burmandesign)	CO1	As per the feedback received from the stakeholders, we have revised the syllabus for the 2018-19 batch.	5%

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18BT3113	Biochemical Reaction Engineering	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/ETFCZNX6LSVPhymIhnb50fUBbgGqdWB-6ejK0vfd1-XP8Q?e=fC4A2I	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EevQt0WHPL9Jp5t3gwigc0MB6e7AKdaLG5hhzT4llYj3Nw?e=fiNmib	Temperature dependency of rate equation.	CO1	As per the feedback received from the stakeholders we have revised the syllabus for 2018-19 batch.	5%
18BT3201	Plant Biotechnology	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EYSM-srdflxGkbj3x9Iz_z8BVYmoSrAr1y2hdfxZLP2feQ?e=wtHtbG	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/ETsvunmOZmJLhMH1MdSS5FQBpWLZAOabXMuPXcjeOfBuMg?e=zSHdmJ	Peptide hormones and biodegradable plastics in plants. Production of bioactive secondary metabolites and strategies for product yield.	CO4	As per the feedback received from the stakeholders we have revised the syllabus for 2018-19 batch.	15%
18BT3202	Downstream Processing	PC	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/ETQbVxE5Oa5MoEQYBKE93bURvnEnYkipVGGuf10WN5aaang?e=MEePsS	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/Ebgmf1BL8udCva8FrdqMkG4BdfMS19BbsGSGXlOv2uuNKO?e=6l5Z7X	Crystallization, Principles of crystallization and equipment. Principles of drying and lyophilization, Freeze dryer.	CO4	As per the feedback received from the stakeholders we have revised the syllabus for 2018-19 batch.	10%

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18SC1106	Technical Skill - 1 (Coding)	SKE	NA	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EZGyGIXqvcJbq1MPLcqYlUBiqiEPQSS6dgetlZV1UTrsg?e=Zxshad	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new skilling course introduced in 2018-19 batch.	100%
18SC1207	Technical Skill - 2 (Coding)	SKE	NA	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/ERHu7YXFRMRBndBKSalPGGABjtdADIY6dNjM6klkd9Ysg?e=ejaWS3	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new skilling course introduced in 2018-19 batch.	100%
18TS1001	Skilling for Engineers-1 (Medical Lab Technology)	SKE	NA	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/ETYMbaHuARIPn13ysoCc1MBMM3KlyU0BWE GTXOGIBhWrA?e=hXBwhe	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new skilling course introduced in 2018-19 batch.	100%
18TS1002	Skilling for Engineers-2 (Process Engineering Tools)	SKE	NA	https://kluniversityin-my.sharepoint.com/:b:/g/personal/gsva_kluniversity_in/EYM_t00TZ8pOmP rTraOxpZIB5FGWcMw-NpbzxG7ZKsYqMQ?e=FE775I	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new skilling course introduced in 2018-19 batch.	100%

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18TS1003	Skilling for Engineers-3 (Animal Cell Culture)	SKE	NA	https://kluniversity.in-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/ERGXOckE5UJGqHujEBA92HoB3AcWSGReFNO0S5s2q4z4IQ?e=d0WuhR	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new skilling course introduced in 2018-19 batch.	100%
18TS1004	Skilling for Engineers-4 (Advanced Instrumentation)	SKE	NA	https://kluniversity.in-my.sharepoint.com/:b:/g/personal/gsiva_kluniversity_in/EUJGn-98k2_1MgbSoqekLSksBle5sgOKXuMuyDLRoZu49bg?e=QgAkzs	NEW COURSE	CO1,CO2, CO3,CO4	As per the feedback received from the stakeholders we have new skilling course introduced in 2018-19 batch.	100%

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Annexure III

Minutes of the XXIII DAC meeting-Department of Biotechnology held on 20-05-2018 in C-501 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 2018-19 admitted batch.	Approved
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The following value added courses for Y18 batch were 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 Y18 batch structure along with Employability, Entrepreneurship and skill development categorizations.	Approved
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Resolution: For the A.Y. 2018-19 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 as 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.

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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. Indrani, Research Head, Unique Biotech Pvt.ltd, Hyderabad, Telangana, Suggested to include Bernoulli's equation and hydrodynamic methods in the subject Transport Process in Biological systems	Suggested topics have been incorporated in Transport process in Biological systems approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Industry Personnel	Dr. Rajesh, Scientist E, Sanofi Biotech, Medchal, Telangana, Recommended to add SKE-2 (Process Engineering Tools) courses for 2018-2019 curriculum	Courses are floated Under skilling for engineers categorization approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Industry Personnel	Dr. Alok Kumar, Sanofi Biotech, Medchal, Telangana, Recommended to add SKE-3 (Animal cell culture) courses for 2018-2019 curriculum	Courses are floated Under skilling for engineers categorization approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018

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Industry Personnel	Dr. Easwaran, Biocon Research Academy, Bangalore, Recommended to add SKE-4 (Advanced instrumentation) courses for 2018-2019 curriculum	Courses are floated Under skilling for engineers categorization approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Academic Peer	Dr. Sirsendu Ray, NIT Rourkela, Suggested to incorporate Technical skills-1 for computing in 2018-19 curriculum	Technical skills-1 (Coding) have been incorporated to 2018-19 admitted batch approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Academic Peer	Dr. Amit Srivastava, IIT BHU, UP, Suggested to incorporate Technical skills-2 for computing in 2018-19 curriculum	Technical skills-2 (Coding) have been incorporated to 2018-19 admitted batch approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Alumni	Mr. Naresh Varma, Hetero drugs, Suggested to include concepts like cloning of PCR products in Genetic Engineering course	Suggested topics have been incorporated in Genetic Engineering approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018

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Alumni	Ms. V. Sravya, Biocon Bangalore, Advised to incorporate topics like heteropolysaccharides in Biochemistry	Suggested topics have been incorporated in Biochemistry approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Alumni	Ms. Satya Madhuri B, Amazon Hyderabad Suggested to include Energy balance concepts in Process engineering principles	Suggested topics have been incorporated in Process Engineering Principles approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Alumni	Mr. B.Mahesh, Dr.Reddys labs Pvt ltd Hyderabad Advised to add Skilling for Engineers-1 (Medical Lab Technology) in course curriculum for 2018-19	Course is floated Under Skilling categorization approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Students	Ms. Bhavana P, Recommended to add staining techniques in Microbiology	Suggested topics have been incorporated in Microbiology approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018

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Students	Ms. Sarvani Vemuri, Suggested to enrich the syllabus in accordance with industrial needs	Suggested modifications have been incorporated in 2018-19 curriculum approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Students	Mr. Sabin Recommended to alter the LTP structures for the courses like Indian Heritage & culture and Indian constitution 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 Y19 regulation approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Students	Ms Lasya V, Recommended to add Pylogenetic analysis in Bioinformatics	Suggested topics have been incorporated in Bioinformatics approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Students	Ms. Yochana Advised to include Temperature dependency on rate of reaction in Biochemical Reaction Engineering	Suggested topics have been incorporated in Biochemical Reaction Engineering approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018

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Students	Mr. Shaikh Khaja Recommended to add peptide hormones and biodegradable plastics in Plant Biotechnology	Suggested topics have been incorporated in Plant Biotechnology approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Parents	Mr. Satyanarayana Rao, Telangana, Advised to include isotopic techniques in Bio analytical Techniques	Suggested topics have been incorporated in Bio analytical Techniques approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018
Parents	Ms. Sravanthi Naidu, Vijayawada, Suggested to add concepts such as Media optimization techniques in Fermentation Technology	Suggested topics have been incorporated in Fermentation Technology approved by BOS and eventually recommended to Academic council.	B.Tech	2018-2019	Biotechnology	21/05/2018

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Annexure-V: Pre Ph.D Courses

S.NO.	COURSE CODE	NAME OF THE COURSE	PAPER NUMBER
1	18BT201	Bio analytical Techniques	PAPER-2
2	18BT202	Plant Biotechnology	PAPER-3
3	18BT203	Genetic Engineering	PAPER-3
4	18BT204	Microbial Technology	PAPER-3
5	18BT205	Biochemistry	PAPER-3
6	18BT206	Molecular Modelling and Drug Design	PAPER-3
7	18BT207	Bioprocess Engineering	PAPER-3
8	18BT208	Immunotechnology	PAPER-3


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Annexure-VI: New Courses Syllabus

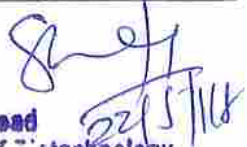
Course Code: 18BT1002 Course Title: ENGINEERING GRAPHICS & DESIGN FOR BIOTECHNOLOGISTS L-T-P-S: 0-0-4-0 Credits: 2

Course Rationale: The course rationale for "Engineering Graphics & Design for Biotechnologists" is centered around preparing graduates to excel in a biotechnology industry that demands both technical expertise and effective visual communication skills. By integrating engineering graphics and design principles into biotechnology education, this course empowers students to meet the challenges of the modern biotech landscape while enhancing their employability and career prospects.

Course Objective: Students can develop a unique skill set that combines engineering graphics proficiency with biotechnology expertise, making them valuable assets to biotech companies, research institutions, and other organizations within the biotechnology industry.

COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
1	Use the engineering graphics principles to represent biological components, processes, and systems commonly used in biotechnology.	PO1,PO3,PO7	3
2	Understanding and application of design principles relevant to the field of biotechnology.	PO1,PO3	3
3	Effective use of engineering graphics as a tool for communication among interdisciplinary teams.	PO1,PO7	3
4	Exploration of emerging technologies and trends in biotechnological design.	PO1,PO7	3


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Syllabus

Introduction to Engineering Drawing : Principles of Engineering Graphics and their significance – Drawing Instruments and their Use- Conventions in Drawing – Lettering – Geometric Constructions – Scales: Plain and Vernier scales Orthographic Projection in First Angle Projection: Principles of Orthographic Projections- conventions- First and Third Angle, Projections of Points and Lines inclined to both planes, True lengths, traces. Projections of Planes & Solids: Projections of regular planes inclined to both planes. Projections of Regular solids inclined to one plane Sections and Sectional Views:-Right Regular Solids - Prism, Cylinder, Pyramid, Cone Engineering Curves used in Engineering Practice & their Constructions: Conic Sections: Ellipse, Parabola, Hyperbola and Rectangular Hyperbola – oblong, concentric method Special Curves: Cycloid, Epicycloid, Hypocycloid and Involute Developments of solids: Development of surfaces of right regular solids – Prisms, Cylinder, Pyramid cone and their parts Isometric Projections: Principles of Isometric Projection- Isometric Scale- Isometric view conventions- Isometric View of Lines, Plane Figures, simple problems Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions Introduction of Computer Graphics covering & Customisation & CAD Drawing Demonstrating knowledge of the theory of CAD software, Drawing Area, Dialog boxes and windows, Shortcut menus, Command Line, Status Bar, Different methods of zoom, erase objects. Scale settings, applying dimensions to objects and annotate; use of Layers, Create, edit and use customized layers. Process flow and production Diagrams Equipment symbols, Flow sheet symbols for detailed equipment and processes; Process flow diagrams for - thermochemical conversion of biomass to ethanol, - ionoSolv process, - ethanol purification process, - biodiesel production, - single cell oil production, - Penicillin production, - Amylase enzyme production.

Text Books: 1. Engineering Drawing, N.D.Bhat/ Charotar
2. Engineering Drawing ,N.S.Parthasarathy,VelaMurali

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3. Thermo chemical Conversion of Biomass to Liquid Fuels and Chemicals, Mark Crocker
4. Advances in Biodiesel Production: Processes and Technologies, R Luque, J A Melero
4. Basic Biotechnology, edited by Colin Ratledge, Bjorn Kristiansen

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BOS Chairman

Head
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Course Code: 18BT1003 Course Title: Workshop Practices for Biotechnologists

L-T-P-S: 0-0-4-0

Credits: 2

Course Rationale: The course rationale emphasizes the critical role of practical skills in enhancing employability for biotechnologists. By providing hands-on training and addressing the practical needs of the biotechnology industry, the workshop aims to empower participants with the expertise and confidence needed to excel in their careers and contribute meaningfully to biotechnology research and applications.

Course Objective: The "Workshop Practices for Biotechnologists" course aims to bridge the gap between theoretical knowledge and practical application, ultimately preparing participants for successful careers in various biotechnology-related fields and enhancing their employability.

COURSE OUTCOMES (CO'S)

CO NO	Course Outcome (CO)	PO/ PSO	Blooms Taxonomy Level (BTL)
1	Students will be able to demonstrate proficient skills in operating basic laboratory equipment commonly used in biotechnology, such as centrifuges, pipettes, and microscopes.	PO1,PO3, PO7	3
2	Students will be capable of designing and executing experiments related to common biotechnological processes, ensuring accuracy, precision, and adherence to safety protocols.	PO1,PO3	3
3	Students will be able to analyse and interpret experimental data, drawing relevant conclusions and making recommendations for further experimentation.	PO1,PO7	4

Sudhakar
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4	Students will develop effective teamwork and communication skills through collaborative projects, fostering a professional and ethical work environment within the laboratory setting.	PO1,PO7, PO8	4
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Syllabus

Module 1: Laboratory Safety and Basic Skills: Introduction to laboratory safety protocols, including personal protective equipment (PPE), chemical handling, and emergency procedures, Proper handling and disposal of hazardous materials and biohazardous waste, Introduction to common laboratory tools and equipment used in biotechnology research, Hands-on practice in pipetting, weighing, measuring, and dilution techniques, Introduction to aseptic techniques and microbiological safety.


Module 2: Molecular Biology Techniques: DNA extraction methods from various biological samples, Polymerase chain reaction (PCR) techniques for amplifying DNA segments, Gel electrophoresis for analyzing DNA fragments and RNA samples, DNA cloning techniques, including restriction enzyme digestion, ligation, and transformation, Introduction to gene expression analysis methods such as reverse transcription PCR (RT-PCR).

Module 3: Protein Analysis and Purification: Introduction to protein extraction from cells or tissues, Principles of protein separation using techniques like sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE), Protein purification methods, including chromatography (affinity, ion exchange, size exclusion), Enzyme assays to determine protein activity and kinetics, Introduction to Western blotting for protein detection and analysis. **Module 4: Cell Culture Techniques:** Introduction to cell culture and sterile techniques, Preparation of cell culture media and reagents, Cell counting and viability assessment, Subculturing and passaging of adherent and suspension cell lines, Cell freezing and thawing protocols for long-term storage.

BOOKS: 1. "Laboratory Manual of Biotechnology" by R.C. Dubey and D.K. Maheshwari

Signature

BOS Chairman


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Course Code: 18SC1106

Course Title: Technical Skills-1 (Coding)

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

Credits:1.5

Course Rationale: The Coding-1 course provides participants with a well-rounded skill set, ranging from foundational programming knowledge to advanced coding techniques. By focusing on practical applications and aligning with industry demands, these courses contribute significantly to employability and overall skill development in the competitive field of software development and programming.

Course Objective: The objective of Coding-1 is to provide participants with a solid foundation in programming concepts, logic, and syntax.

Syllabus

Introduction to Servlets: Lifecycle of a Servlet, JSDK The Servlet API, The javax.servelet Package, Reading Servlet parameters, and Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, servlet chaining-Security Issues.Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a Servlet, Introduction to JSP The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations. Database Access Database Programming using JDBC Studying Javax.sql. package Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page. Introduction to struts framework.

Text Books: The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.

Reference Books :1. Programming with Java, by E. Balagurusamy, McGraw Hill Education

2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

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

Course Code: 18SC1207

Course Title: Technical Skills-II (Coding)

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

Credits: 1.5

Course Rationale: The Coding-II course provides participants with a well-rounded skill set, ranging from foundational programming knowledge to advanced coding techniques. By focusing on practical applications and aligning with industry demands, these courses contribute significantly to employability and overall skill development in the competitive field of software development and programming.

Course Objective: The objective of Coding-II is to build upon the foundational programming skills acquired in Coding-1 and enable participants to tackle more complex programming challenges.

Syllabus

Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments. Illustrative programs: exchange the values of two variables, circulate the values of n variables, and distance between two points. Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search. Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as a return value; Dictionaries: operations and methods; advanced list processing - list comprehension. Illustrative programs: selection sort, Insertion sort, merge sort, histogram.

Text Books: 1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 <http://greenteapress.com/wp/thinkpython/>) 2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python - Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books: 1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised And Expanded Edition, MIT Press, 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

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Course Code: 18TS1001 Course Title: SKILLING FOR ENGINEERS-I (MEDICAL LAB TECHNOLOGY)

L-T-P-S: 0-0-0-8


Credits: 2

Course Rationale: To prepare students with the practical skills, theoretical knowledge, and professional competencies necessary to enter the workforce as skilled and sought-after medical laboratory technicians. The rationale is centered on equipping graduates with a strong foundation in laboratory science and technology, enabling them to excel in a variety of healthcare settings.

Course Objective: To prepare students with the knowledge and skills necessary to excel in the field of clinical laboratory science. MLT is a crucial component of healthcare, as it involves performing various laboratory tests and analyses to aid in the diagnosis, treatment, and prevention of diseases.

Syllabus

Mendeley: Introduction, methods to build library online and offline, organize the library, using search functions, share documents, annotate documents, using mendeley to cite., Introduction to Medical Coding, Human Anatomy and physiology, Cardio Vascular System, Blood and its Components , Integumentary System, Endocrine System, Urology, and Male Reproductive System.- Location, Shape, Size, Structure, Physiology, Pathology, Diagnostic Test, Terminologies. Female Reproductive Systems, Nervous System, Gastro -Intestinal System, Pulmonology, Urinary System, Orthopedics, Lymphatic System-Location, Shape, Size, Structure, Physiology, Pathology, Diagnostic Test, Terminologies., Current Procedure Terminology Coding (CPT), CPT Codes, CPT Description, Medical Record Format, Speciality Listings and its Format, Examples of CPT Speciality Code Practice, HCPCS Coding ers, Surgery, International Classification of Disease Coding (ICD), ICD Codes, ICD 9 CM, ICD 10 Transition, Diagnosis Interpretation, Usage of ICD Manuals, Index Listings, Tabular Listings, Software usage, Examples of Dx Code Practice, Biostatistics, Applications of Biostatics in clinical Trial Management: Correlation - simple linear regression - multiple regressions - T-test - F-test - Chi-square test - ANOVA - One way ANOVA. Biostatistics and database management system.


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Textbooks 1. Essent Human Anatom Physi_12 (12th Edition) by Elaine N. Marieb, Suzanne M. Keller, ISBN-13: 978-0134395326 ICD-10-CM Code Book ISBN: 978-1-626884-718

2. SPSS for Dummies, Keith McCormick, Jesus Salcedo with Aaron Poh Wiley (3rd edition, 2015)

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Course Code: 18TS1002 Course Title: SKILLING FOR ENGINEERS-II (PROCESS ENGINEERING TOOLS)

L-T-P-S: 0-0-0-8

Credits: 2

Course Rationale: The course rationale aims to empower students with a well-rounded education that not only prepares them for technical roles in process engineering but also enhances their employability by cultivating problem-solving, communication, and teamwork skills. For the most up-to-date and specific information, it's advisable to refer to the curriculum and program details provided by accredited institutions offering process engineering tools courses.

Course Objective: The contemporary objective of process engineering tools is to empower engineers with the resources they need to design, optimize, and manage industrial processes in a way that is sustainable, safe, efficient, and adaptable to changing technological and market trends. These tools play a crucial role in achieving operational excellence and driving innovation across various industries.

Syllabus

Preparation of medium for bacterial culture, Isolation of microorganism from contaminated soil, **BIOCHEMICAL CHARACTERIZATION OF ISOLATED BACTERIA-** Catalase test, Citrate test, Coagulase test, DNase TEST, Hippurate test, hydrogen Sulfide production, indole test, method of Kovac's reagent, lecithinase test, mixed acid fermentation, oxidase test, potassium hydroxide test, urease test, voes-Proskauer test, **MICROBIAL KINETICS-**construction of growth curve and estimation of growth kinetic parameters and Monod constant from isolated bacterial culture, **OPTIMIZATION OF ISOLATED BACTERIAL CULTURE-** Plackett - Burman and central composite design, **STABILITY STUDIES OF ISOLATED BACTERIAL CULTURE-** Temperature stability, pH stability and effect of substrate concentration.

TEXT BOOKS: 1. D.G.Rao, Biochemical Engineering, McGraw Hill, 2008

2. Pauline Doran, Bioprocess Engineering Principles, 2008

3. Gerard J.Tortora, Berdell R.Funke and Christine L.Case, Microbiology: An Introduction, 13th Edition, 2019.

REFERENCE TEXTBOOKS

1. Bailey & Ollis, Fundamentals of Biochemical Engineering, Mcgraw Hill Higher Education (31121988)

2. Atkinson & Mavituna, Biotechnology and Biochemical Engineering Springer (Mar1973)

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**Course Code: 18TS1003
(ANIAML CELL CULTURE)**

Course Title: SKILLING FOR ENGINEERS-III

L-T-P-S: 0-0-0-8

Credits:2

Course Rationale: The course on animal cell culture is designed to empower students with the knowledge, skills, and ethical awareness required to excel in the rapidly evolving fields of biotechnology and biomedical research. By aligning with industry demands and emphasizing practical application, the course enhances students' employability and contributes to their holistic skill development.

Course Objective: Animal cell culture is a fundamental and essential technique in modern biotechnology and biomedical research. It involves growing and maintaining animal cells in a controlled environment, allowing scientists to study cell behaviour, test new drugs, and produce valuable bio-products. The course on animal cell culture is designed to equip students with the knowledge and skills necessary to work with animal cells in vitro. This course is highly relevant in today's biotechnology and pharmaceutical industries, where cell culture techniques are integral to various applications such as drug discovery, vaccine production, and tissue engineering. By providing hands-on experience and a theoretical understanding of animal cell culture, the course aims to bridge the gap between academic learning and industry demands.

Syllabus

Introduction to animal cell culture lab, Cell culture terminology and application of cell culture chemicals, Sterilization Techniques, Preparation of sera, Aseptic Techniques and Good Cell Culture Practice, Introduction to Primary cell culture, Clotting of Monocytes, Isolation of hepatocytes from goat liver, Isolation of chondrocytes from porcine ears, Maintenance of cell lines and cryopreservation, MTT Cell Proliferation Assay, Cell culture experiment application, graph Data, count cells, and application.

TEXTBOOKS

1. Tajamul Islam Shah, Animal Cell Culture (A manual of basic techniques), Edu creation Publishing, 2018

REFERENCE TEXTBOOKS

1. R. Ian Freshney. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications 6th edition. Publisher: Wiley-Blackwell.

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Course Code: 18TS1004

Course Title: SKILLING FOR ENGINEERS-IV

(ADVANCED INSTRUMENTATION)

L-T-P-S: 0-0-0-8

Credits:2

Course Rationale: The course on advanced instrumentation aims to empower students with the knowledge, skills, and practical expertise needed to leverage advanced instruments effectively. By emphasizing interdisciplinary collaboration, problem-solving, and industry relevance, the course enhances students' employability and contributes significantly to their skill development in the dynamic landscape of modern scientific research and industry.

Course Objective: The course on advanced instrumentation is designed to provide students with a comprehensive understanding of state-of-the-art analytical techniques and instruments, preparing them to excel in research, development, and industry roles. By immersing students in the principles and applications of advanced instrumentation, the course aims to bridge the gap between theoretical knowledge and practical expertise, thereby enhancing their employability and contributing to their skill development.

Syllabus

Protein profiling by western blot analysis, Gene expression studies by qPCR, Analysing gels by Gel doc and Image J, Cell imaging by Fluorescent Inverted Microscope, Cell sorting and count by flow cytometry, Isolation of natural products by preparative HPLC, Drug stability studies by FTIR, Design of experiments with small scale bioreactor, Characteristic studies of perfume fragrances by Gas chromatography, Freezing of biological compounds by lyophilizer.

TEXT BOOKS: 1. Basseter GC, Silverstein RM. Spectrophotometric identification of organic compounds. Wiley, New York. 1992:111.

2. Van Impe JF, Vanrolleghem PA, Iserentant DM, editors. Advanced instrumentation, data interpretation, and control of biotechnological processes. Springer Science & Business Media; 2013 Jun 29.

REFERENCE TEXTBOOKS

1. Geddes CD, Lakowicz JR, editors. Advanced concepts in fluorescence sensing: Part A: Small molecule sensing. Springer Science & Business Media; 2007 May 24.

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Course Code: 18UC0011

Course Title: ENTREPRENEURSHIP

L-T-P-S: 0-0-4-0

Credits: 2

Course Rationale: The course rationale of entrepreneurship is rooted in its potential to drive economic, social, and cultural advancement by nurturing a spirit of innovation, enabling the creation of new ventures, and empowering individuals to contribute meaningfully to their communities and the global economy.

Course Objective: The course objective of entrepreneurship is to empower individuals with the knowledge and skills required to navigate the challenges and opportunities of starting and managing a new venture, fostering a culture of innovation, and contributing to economic growth and development.

Course Outcomes (CO's)

CO NO	Course Outcome (CO)	PO/ PSO	Blooms Taxonomy Level (BTL)
1	Students will be able to develop a comprehensive business plan, incorporating elements such as market analysis, financial projections, and risk assessment.	PO3	3
2	Students will have acquired the skills to identify and evaluate potential business opportunities, considering market trends, customer needs, and competitive landscapes.	PO1	3
3	Students will demonstrate effective communication and pitching skills, presenting their business ideas to potential stakeholders, investors, and customers.	PO5	3
4	Students will exhibit an understanding of ethical considerations, social responsibility, and sustainable business practices in entrepreneurial ventures.	PO6	3

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Syllabus

Module-I: Introduction to Entrepreneurship Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, Myths about entrepreneurs, agencies in entrepreneurship management, and the future of entrepreneurship types of entrepreneurs.

Module-II: The Entrepreneur Why to become entrepreneur, the skills/ traits required to be an entrepreneur, Creative and Design Thinking, the entrepreneurial decision process, skill gap analysis, role models, mentors and support system, entrepreneurial success stories.

Module-III: E-Cell Meaning and concept of E-cells, advantages to join E-cell, significance of E-cell, various activities conducted by E-cell

Module-IV: Communication Importance of communication, barriers, and gateways to communication, listening to people, the power of talk, personal selling, risk-taking & resilience, and negotiation.

Books:

1. "Effectual Entrepreneurship" by Stuart Read, Saras Sarasvathy, Nick Dew, Robert Wiltbank, and Anne-Valérie Ohlsson
2. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries

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