



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

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School of Bio and Chemical Engineering

Department of Biotechnology

1.2.1 New Courses Introduced in 2022- 2023

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SBTA3010	Molecular Therapeutics and Diagnostics	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- Understand the principles and applications of molecular diagnostics techniques and biomarkers, and assess their significance in disease diagnosis, prognosis, and personalized medicine.
- Evaluate different molecular therapeutic approaches, including gene therapy, RNA-based therapies, and targeted treatments, and assess their potential impact on clinical practice and the challenges associated with translating them from bench to bedside.

UNIT 1 INTRODUCTION TO MOLECULAR THERAPEUTICS AND DIAGNOSTICS**9 Hrs.**

Overview of molecular therapeutics and diagnostics, Historical development and milestones in the field, Importance of personalized medicine and targeted therapies, Ethical considerations in molecular medicine research

UNIT 2 MOLECULAR DIAGNOSTICS TECHNIQUE,**9 Hrs.**

Polymerase chain reaction (PCR) and its variants, Nucleic acid hybridization methods (FISH, Southern blotting), Next-generation sequencing (NGS) for genetic analysis, Microarray technology for gene expression profiling, Point-of-care diagnostics and portable devices

UNIT 3 BIOMARKERS AND DISEASE DIAGNOSTICS**9 Hrs.**

Biomarkers as indicators of disease or treatment response, Role of genomics, transcriptomics, proteomics, and metabolomics Identification and validation of disease-specific biomarkers, Clinical applications of biomarker-based diagnostics

UNIT 4 MOLECULAR THERAPEUTIC APPROACHES**9 Hrs.**

Gene therapy: viral and non-viral vectors, CRISPR-based therapies, RNA-based therapies: siRNA, antisense oligonucleotides, Monoclonal antibodies and antibody-drug conjugates, Small molecule inhibitors and targeted therapies
Nanomedicine and drug delivery strategies

UNIT 5 CLINICAL APPLICATIONS AND CHALLENGES**9 Hrs**

Molecular diagnostics in oncology, infectious diseases, and genetic disorders, Personalized medicine and tailoring treatments based on genetic profiles, Challenges in translating molecular therapeutics to clinical practice, Regulatory and ethical considerations in molecular medicine, Future trends and emerging technologies in the field

Max.45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Understand the principles and fundamentals of molecular therapeutics and diagnostics
 CO2 - Analyze various molecular diagnostic techniques and their applications.
 CO3 - Evaluate the role of biomarkers in disease diagnosis and prognosis.
 CO4 - Explore different molecular therapeutic approaches and their mechanisms.
 CO5 - Assess the clinical applications and challenges of molecular medicine.
 CO6 - Identify emerging trends and future directions in the field.

TEXT / REFERENCE BOOKS

1. Lela Buckingham and Maribeth L. Flaws, "Molecular Diagnostics: Fundamentals, Methods, and Clinical Applications" 2nd Edition, 2020
2. Runjan Chetty, Lawrence M. Weiss, and Zhong-Yin Zhang, "Principles of Molecular Medicine, 2nd Edition, 2020
3. Bernard R. Glick, Jack J. Pasternak, and Cheryl L. Patten, "Molecular Biotechnology: Principles and Applications of Recombinant DNA", 5th Edition, 2020
4. Jennifer L. Horsley and Ann M. Hornsby, "Introduction to Molecular Medicine", 3rd Edition 2019

ANNEXURE II

SBTA7014	BIOTECHNOLOGY ENTREPRENEURSHIP	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVE

1. To provide students with a comprehensive understanding of the principles and practices of biotechnology entrepreneurship.
2. To equip students with the skills and knowledge required to successfully plan, launch, and manage biotech startups.

UNIT 1 INTRODUCTION TO BIOTECHNOLOGY ENTREPRENEURSHIP**9 Hrs.**

Overview of entrepreneurship in the biotechnology sector, Importance of innovation and startups in biotechnology, Role of entrepreneurship in translating research into commercial products

UNIT 2 IDENTIFYING AND DEVELOPING BIOTECH IDEAS**9 Hrs.**

Idea generation and opportunity recognition in biotechnology, Evaluating the feasibility and viability of biotech ideas, Intellectual property (IP) considerations: patents, copyrights, trademarks.

UNIT 3 BUSINESS PLANNING AND STRATEGY**9 Hrs.**

Elements of a business plan for biotech startups, Market analysis and target audience identification, Developing a unique value proposition and competitive advantage

UNIT 4 FUNDING AND FINANCIAL MANAGEMENT**9 Hrs.**

Sources of funding for biotech startups: angel investors, venture capital, grants, financial projections, budgeting, and managing startup finances, Strategies for attracting investment and securing funding

UNIT 5 LAUNCHING AND SCALING BIOTECH VENTURES**9 Hrs.**

Legal and regulatory challenges in biotechnology entrepreneurship, Building a startup team: recruitment, roles, and leadership, Scaling up operations, managing growth, and achieving sustainability

Max. 45 Hrs.**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 - Identify and evaluate potential business opportunities within the biotechnology sector.
- CO2 - Develop and present a detailed business plan for a biotech startup, considering market analysis and financial projections.
- CO3 - Apply strategies for attracting funding and managing finances specific to biotech ventures.
- CO4 - Navigate legal, ethical, and regulatory challenges commonly encountered in biotechnology entrepreneurship.
- CO5 - Analyze the competitive landscape of biotech startups and formulate effective positioning strategies.
- CO6 - Demonstrate an understanding of the key factors involved in scaling up and sustaining a biotech venture.

TEXT / REFERENCE BOOKS

1. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries. 2011
2. "Biotechnology Entrepreneurship: Starting, Managing, and Leading Biotech Companies" by Craig Shimasaki. 2014
3. "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers" by Alexander Osterwalder and Yves Pigneur. 2010
4. "Venture Deals: Be Smarter Than Your Lawyer and Venture Capitalist" by Brad Feld and Jason Mendelson. 4th Edition, 2016
5. "The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company" by Steve Blank and Bob Dorf. 1st Edition, 2012

SBTA3007	Research Methodology in Biotechnology	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

- To acquaint the students with key concepts and tools of data analysis techniques.

UNIT 1: BASIC CONCEPTS OF PROBABILITY AND STATISTICS

9 Hrs.

Rules of probability, discrete and continuous probability distribution. Moments: Mean, variance and covariance. Bayes theorem and likelihood. Statistical tests – t-test, ANOVA, Chi square test.

UNIT 2: BASIC CONCEPTS OF LINEAR ALGEBRA

9 Hrs.

Vector and vector operations, matrix and matrix operations. Determinant and inverse of matrix. Eigen value and eigenvector. Linear system of equations, singular value decomposition.

UNIT 3: CORRELATION AND REGRESSION

9 Hrs.

Correlations, linear regression, multiple linear regression, nonlinear regression and logistic regression.

UNIT 4: CLUSTERING, CLASSIFICATION AND HIGHER DIMENSIONAL DATA

9 Hrs.

Distance measures for clustering, k-means clustering, hierarchical clustering, decision tree classifier, support vector machines. Higher dimensional data in biology, Principal component analysis, t-SNE, diffusion maps.

UNIT 5: Research and publication

9 Hrs.

Forming a Hypothesis, Techniques of Scientific Measurement, Testing of hypothesis, Methods of Theoretical Research, The Art of Scientific Communication, Presentation in Seminars and Conferences, Sponsored Research, Ethical Conduct in Science.

COURSE OUTCOMES

On completion of course, student will able to

CO1 –Interpret scientific data using statistical methods.

CO2 –Articulate biological data as algebraic equations

CO3 –Correlate and deduce inference from data.

CO4 –Categorize data to infer scientific knowledge.

CO5 –Write a research report and analyze ethical issues.

CO6 –Write a research proposal following ethical norms.

TEXT / REFERENCE BOOKS

1. Whitlock, Michael C.; Schluter, Dolph. The Analysis of Biological Data (2nd edition). Freeman, W. H. & Company, 2014.
2. Yang, Zheng R.; Machine Learning Approaches to Bioinformatics. World Scientific, 2010.
3. Moses, Alan; Statistical Modeling and Machine Learning for Molecular Biology. Chapman and Hall/CRC, 2016.
4. Hartvigsen, Gregg. A Primer in Biological Data Analysis and Visualization Using R, (1st Edition). Columbia University Press, 2014.
5. Stewart, James; Day, Troy; Biocalculus: Calculus for Life Sciences. Cengage Learning, 2015
6. James, Gareth, et al. An introduction to statistical learning with application in R. Vol. 112. New York: springer, 2013.

SAIC4003	UNIVERSAL HUMAN VALUES	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES

- To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence
- To understand (or developing clarity) the harmony in the human being, family, society and nature/existence
- To strengthen self-reflection
- To develop commitment and courage to act

MODULE 1 COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels. Practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

MODULE 2 UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health. Practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

MODULE 3 UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to

world family. Practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss scenarios. Elicit examples from students' lives.

MODULE 4 UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE

18. Understanding the harmony in the Nature

19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature

20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space

21. Holistic perception of harmony at all levels of existence.

Practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

MODULE 5 IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS

22. Natural acceptance of human values

23. Definitiveness of Ethical Human Conduct

24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

26. Case studies of typical holistic technologies, management models and production systems

27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

28. Sum up. Practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Total: 28 Lectures And 14 Practice Sessions

COURSE OUTCOMES

On completion of the course, the student are expected

CO1: To become more aware of themselves, and their surroundings (family, society, nature)

CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind

CO3: To have better critical ability

CO4: To become sensitive to their commitment towards what they have understood (human values, human relationship and human society)

CO5: To apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction

TEXT /REFERENCE BOOKS

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

3. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

4. The Story of Stuff (Book).

5. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

6. Small is Beautiful - E. F Schumacher.

7. Slow is Beautiful - Cecile Andrews
8. Economy of Permanence - J C Kumarappa
9. Bharat Mein Angreji Raj – PanditSunderlal
10. Rediscovering India - by Dharampal
11. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
12. India Wins Freedom - Maulana Abdul Kalam Azad
13. Vivekananda - Romain Rolland (English)
14. Gandhi - Romain Rolland (English)

ASSESSMENT:

Assessment by faculty mentor: 10 marks

Self-assessment:: 10 marks

Assessment by peers: 10 marks

Socially relevant project/Group Activities/Assignments: 20 marks

Semester End Examination: 50 marks

SBTA2602	ANIMAL CELL AND TISSUE CULTURE LAB	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OBJECTIVE

- To develop the ability to handle animal cell cultures proficiently through aseptic techniques and media preparation, while also recognizing the practical applications of these skills in biotechnological areas such as drug discovery and cell studies

SUGGESTED LIST OF EXPERIMENTS

1. Introduction to Aseptic Techniques and Cell Culture Equipment
2. Preparation of Cell Culture Media
3. Primary Cell Culture
4. Subculturing and Passaging of Cell Lines.
5. Cryopreservation and Revival of Cell Lines.
6. Cell Viability and Cytotoxicity Assays
7. Application of Cell Culture in Biotechnology

COURSE OUTCOMES

On completion of course, student will able to

CO1: Demonstrate aseptic techniques and use of cell culture equipment.

CO2: Prepare various cell culture media and understand their composition.

CO3: Isolate, culture, and subculture primary cells from animal tissues.

CO4: Perform cryopreservation and revival of cryopreserved cells.

CO5: Assess cell viability, perform cytotoxicity assays, and analyze cell morphology.

CO6: Apply cell culture techniques in biotechnological research and understand their relevance in drug discovery and tissue engineering.

SBTA7015	SYNTHETIC BIOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE:

- The course aims to provide students with a comprehensive understanding of the principles, techniques, and applications of synthetic biology, enabling them to design and engineer novel biological systems for various scientific, medical, and industrial purposes.

Unit 1: Introduction to Synthetic Biology**9hrs**

Definition, scope, and historical overview of synthetic biology. Key concepts: genetic circuits, modular design, standard biological parts. Ethical and societal implications of synthetic biology.

Unit 2: Genetic Engineering Techniques**9hrs**

Overview of recombinant DNA technology. DNA synthesis, assembly, and editing methods (PCR, Gibson assembly, CRISPR-Cas). Design principles for creating synthetic DNA constructs.

Unit 3: Synthetic Biological Systems**9hrs**

Building blocks and biological parts in synthetic biology. Introduction to genetic circuits and their components. Examples of synthetic biological systems: toggle switches, oscillators, logic gates.

Unit 4: Applications of Synthetic Biology**9hrs**

Biomedical applications: biosensors, drug delivery systems, engineered microbes for therapy. Industrial applications: biofuel production, enzyme engineering, specialty chemical synthesis. Environmental applications: bioremediation, biosensors for pollutants.

Unit 5: Advanced Topics in Synthetic Biology**9hrs**

Metabolic engineering and pathway design. Directed evolution and protein engineering. Computational tools for synthetic biology design and modeling. Future directions and emerging trends in synthetic biology.

COURSE OUTCOMES On completion of course, student will able to

CO1: Understand the fundamental concepts and principles of synthetic biology, including genetic circuits, modular design, and standard biological parts..

CO2: Apply various genetic engineering techniques, such as DNA synthesis, assembly, and editing methods, to construct synthetic DNA constructs.

CO3: Design and create synthetic biological systems, utilizing genetic circuits and components to engineer specific functionalities.

CO4: Analyze and evaluate the diverse applications of synthetic biology in biomedical, industrial, and environmental contexts, including biofuel production and bioremediation.

CO5: Utilize computational tools to model, simulate, and optimize synthetic biological systems, fostering a deep understanding of their behavior.

CO6: Recognize and discuss the ethical, societal, and environmental implications of synthetic biology applications, demonstrating a responsible approach to technological advancements.

TEXT BOOKS and References

- Paul S. Freemont and Richard I. Kitney, "Synthetic Biology: A Primer" 2021, 2nd Edition
- Yinong Yang, "Biological Engineering: An Introduction to Synthetic Biology" 2016, 1st Edition
- Huimin Zhao, "Synthetic Biology: Tools and Applications" 2020 1st Edition
- Josefine Liljeruhm, Maria F. Suarez, et al. "Synthetic Biology: A Lab Manual" 2017 1st Edition
- Darren N. Nesbeth, Christina D. Smolke, et al. "Synthetic Biology Handbook" 2019 2nd Edition
- Natalie Kuldell, Rachel Bernstein, Karen Ingram, et al. "BioBuilder: Synthetic Biology in the Lab" 2018 2nd Edition
- Editors: Markus Schmidt, Vitor Martins dos Santos, et al. "Synthetic Biology: An Interdisciplinary Challenge" 2020 1st Edition
- Andrew S. Balmer "Synthetic Biology: A Sociology of Changing Practices" 2014 1st Edition



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Board of Studies

Minutes of Meeting (EVEN SEM)

Date: 30th APRIL 2022

Time: 11 am

Chair-person : **Dr. Ramesh Kumar**

Attendees : **Ms. Sathya V**
Scientific Manager, Affigenix Biosolutions Pvt Ltd

Dr. Edward

Head of the Department, Department of Biotechnology,
St. Joseph's College (Autonomous), Trichy

Dr. Ramesh kumar V, Internal member

Dr. Valli Nachiyar C, Internal member

Dr. Jayshree Nellore, Internal member

The Chair-person welcomed the members.

Following which discussions were held as follows,

Agenda Item 1: Review and approval of the course contents for the following courses of 'B.Tech-Biotech' students during the academic year 2022-2023.

- Biomechanics, Molecular Biology and Genetics, Genetic Engineering, Nanobiotechnology, Pharmaceutical Biotechnology, Nanotechnology and Computational Biology Lab
- Professional Elective (Molecular Therapeutics and Diagnostics) Has Been Introduced In 7th Semester

Resolutions: The Board reached a consensus and accorded its endorsement to the curriculum and outline for the above courses (Annexure I). The revised syllabus will be implemented accordingly.

Agenda Item 2: Proposed modifications of the course content for the following courses and Introduction of new elective for 'M.Tech-Biotech' for the academic year 2022-2023

- Advanced Biochemistry, Biochemistry and Microbiology Lab
- New Elective Biotechnology Entrepreneurship

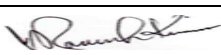
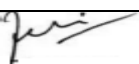
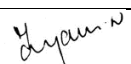
Resolutions: The Board considered and approved the scheme and syllabus for the above courses. (Annexure II)

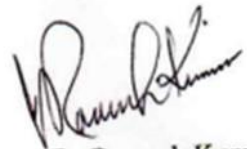
Agenda Item 3: Modifications proposed for the course contents for the following courses of 'Bachelor of Science (Microbiology and Biotechnology)

- Medical Bacteriology, Bacteriology and Virology Lab, Animal Biotechnology

Resolutions: The BoS sanctioned the proposal to revise the course syllabus and approved the same (Annexure III)

Based on the suggestions given by the members, BoS resolved to recommend the minutes to the Academic Council for further approval.

Internal Member	Designation	Signature
Dr. Edward	Head (External member)	
Ms.Sathya V	Scientific Manager (Industry Expert)	
Dr.Ramesh kumar	Head	
Dr.Valli Nachiyar	Professor	
Dr. Jayshree Nellore	Professor	


Dr.Ramesh Kumar
(Head of the Department)

HEAD OF THE DEPARTMENT
DEPARTMENT OF BIOTECHNOLOGY
SATHYABAMA
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Board of Studies

Minutes of Meeting (EVEN SEM)

Date: 26th November 2022

Time: 11 am

Chair-person : **Dr. Ramesh Kumar**

Attendees : **Ms. Sathya V**

Scientific Manager, Affigenix Biosolutions Pvt Ltd

Dr. Edward

Head of the Department, Department of Biotechnology,
St. Joseph's College (Autonomous), Trichy

Dr. Ramesh kumar V, Internal member

Dr. Valli Nachiyar C, Internal member

Dr. Jayshree Nellore, Internal member

The Chair-person welcomed the members.

Following which discussions were held as follows,

Agenda Item 1: A proposition was raised, suggesting the incorporation of a new course intended for the 2019 Batch of 'B.Tech-Biotech' students during the academic year 2022-2023.

Resolutions: The Board reached a consensus and accorded its endorsement to the curriculum and outline for the course "RESEARCH METHODOLOGY IN BIOTECHNOLOGY" (**SBTA3007**) (Annexure I).

Agenda Item 2: It was proposed to introduce New Course for 2020 Batch 'B.Tech-Biotech' for the academic

year 2022-2023

Resolutions: Universal Human Values course was introduced for Batch 2020 as per the AICTE guidelines, 3 credits was given according to norms of AICTE. The Board considered and approved the scheme and syllabus for "UHV". (Annexure II)

Agenda Item 3: Proposed modifications for the 'B.Tech-Biotech' students of the 2020 Batch in Animal Biotechnology Lab for the academic year 2022-2023.

The lab's title was altered to "Animal Cell and Tissue Culture Lab" (SBTA2602), and corresponding changes were made to the syllabus in accordance with the Regulations of 2019. These revisions were presented before the board for their endorsement.

Resolutions: The Board reached a unanimous agreement and provided its official approval to the curriculum and structure of the course titled "Animal Cell and Tissue Culture Lab" (SBTA2602) (Annexure III)

Agenda Item 4: It was proposed to introduce New elective Course for 2022 Batch 'M.Tech-Biotech' for the academic year 2022-2023

Resolutions: The Board reached a consensus and accorded its endorsement to the curriculum and outline for the course "Synthetic Biology" (SBTA7015) (Annexure IV).

Agenda Item 4: Modifications proposed for 2021 batch 'Bachelor of Science students in Research Methodology

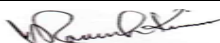
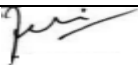
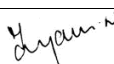
The syllabus for Research Methodology in Life sciences (SBT1002) was revised under Regulations 2019 and the same was tabled before the board for approval

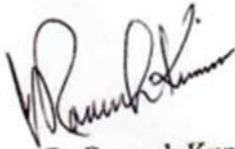
Course code	Course	Units	Old	Changes
SBT1002	Research Methodology	1	Research methodology-basic concepts-types- definition of research problems- statistical methods- Correlation and Regression, Binomial, Poisson and Normal Distributions (mean and variance applications only) - Sampling Distributions: Tests based on t, F, Z and Chi square distributions- Analysis of Variance.	Basic concepts of Research: Research-definition and types of research. Research methods vs methodology, Literature-review and its consolidation, Problem Identification & Formulation, Research Questions and hypothesis
		2	Research design-Nature and Classification of research designs, data classification, primary and secondary data, primary and secondary data-sources-advantages- Sampling- sampling concepts and methods	No change
		3	Principles of biophysical methods used for analysis. X-ray diffraction, Fluorescence, UV, ORD/CD, visible, NMR and ESR spectroscopy, Hydrodynamic methods, Atomic absorption, Plasma emission spectroscopy.	CONCEPTS OF PROBABILITY AND STATISTICS - Rules of probability, discrete and continuous probability distribution. Moments: Mean, variance and covariance. Bayes theorem and likelihood. Statistical tests – t-test, ANOVA, Chi square test

		4	Principles and techniques of nucleic acid hybridization and cot curves, sequencing of proteins and nucleic acids, southern, northern and south-western blotting techniques, PCR, methods for measuring nucleic acids and protein interactions.	CORRELATION AND REGRESSION Correlations, linear regression, multiple linear regression, nonlinear regression and logistic regression.
		5	Principles and applications of tracer techniques in biology, radiation dosimetry, radioactive isotopes and half-life of isotopes, effect of radiation on biological systems, autoradiography, cerenkov radiation and liquid scintillation specterometry	The art of scientific writing and its presentation: Layout of a Research Paper, Journals in Life sciences, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing, Plagiarism and Self-Plagiarism. Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for life science Discipline. Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism

Resolutions: The BoS sanctioned the proposal to revise the course syllabus and approved the same (Annexure V)

Based on the suggestions given by the members, BoS resolved to recommend the minutes to the Academic Council for further approval.

Internal Member	Designation	Signature
Dr. Edward	Head (External member)	
Ms.Sathya V	Scientific Manager (Industry Expert)	
Dr.Ramesh kumar	Head	
Dr.Valli Nachiyar	Professor	
Dr. Jayshree Nellore	Professor	


Dr.Ramesh Kumar
 (Head of the Department)

HEAD OF THE DEPARTMENT
 DEPARTMENT OF BIOTECHNOLOGY
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