



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

Board of Studies

Minutes of Meeting

Date: 10th April 2023

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,

23.4.1: Keeping in mind the New Education Policy the curriculum for the B.Tech. program was completely reframed. The CBCS option was proposed to be given from the 3rd semester onwards. Also different baskets of electives were proposed with the option to include basket of courses as and when the need arises. The choice of community internship and entrepreneurship as an alternative to professional training and project was placed before the board for ratification. Also the provision of obtaining a minors degree with 18 credits and NPTEL credit transfer were discussed.

Resolution: The board welcomed the changes proposed in the curriculum and unanimously agreed with the new curriculum.

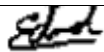
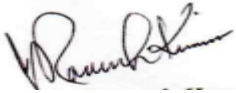
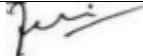
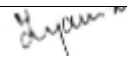
23.4.2: The curriculum for the M.Tech. program was revised to meet the constant demands of the students.

Resolution: The board sanctioned the proposal to revise the curriculum and approved the same.

23.4.3: The curriculum for the B.Sc. Biotechnology program, B.Sc. Microbiology program and B.Sc. Biochemistry program was revised with a provision of honors degree and integrated M.Sc. degree.

Resolution: The board welcomed the proposal to revise the curriculum and approved the same.

Based on the suggestions given by the members, board 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
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Jeppiaar Nagar, Rajiv Gandhi Salai
Chennai-600 119



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Board of Studies Minutes of Meeting (ODD SEM)

Date: 21st July 2023

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. Thyagarajan, Internal member

Dr. Jayshree Nellore, Internal member

The Chair-person welcomed the members. Following which discussions were held as follows

Agenda Item 1: It was proposed to update the syllabus of SBBA1602 - Research Methodology for 2020 Batch 'B.Sc-Biotech/Biochemistry/Microbiology' for the academic year 2023-2024

The proposed changes to the syllabus were presented, emphasizing the shift from the old syllabus to the new one

Members discussed the rationale behind the changes, including the inclusion of relevant topics such as ethical considerations in research, literature review processes, and modern tools for research.

The new course objectives, including the understanding of research terminology, awareness of ethical principles, and the ability to critically analyze published research, were reviewed and unanimously approved.

The breakdown of units in the new syllabus was presented and discussed:

- Unit 1: Basic Concepts of Research
- Unit 2: Research Design and Sampling
- Unit 3: Research Resources
- Unit 4: Research Writing
- Unit 5: Tools for Research

Resolutions: The course outcomes for the new syllabus were reviewed, and the members agreed that they aligned well with the objectives. The changes in the syllabus for SBBA1602 - Research Methodology were unanimously approved by the Board of Studies.

Agenda Item 2: Discussion and approval of the new course SBTA4005: Bioentrepreneurship in Biotechnology and revisions to the syllabus SBTA3005: Medical Biotechnology and SCHA1411: Chemical Reaction Engineering for 2021 Batch 'B.Tech-Biotech' for the academic year 2023-2024

Dr.Prakash, the course coordinator, introduced the new course SBTA4005 - Bioentrepreneurship, outlining the course objectives and its relevance to the life sciences and biotechnology sectors. The course objectives were discussed and found to be aligned with the aim of introducing students to bioentrepreneurship principles and fostering an understanding of identifying and evaluating entrepreneurial opportunities in the bioindustry.

The Chairperson introduced the proposal for revisions to the syllabus for SBTA3005: Medical Biotechnology, emphasizing the need for updates to align the course content with current advancements in the field.

Dr.Jayshree Nellore, the course coordinator, presented the new syllabus for SBTA3005 - Medical Biotechnology, highlighting the updates and changes made.

The revised course objectives were discussed, emphasizing the historical evolution and technological advancements in medical biotechnology, as well as the integration of genomics, DNA sequencing, and artificial intelligence in medical diagnostics.

A detailed comparison of unit-wise changes between the old and new syllabus was presented. Notable changes included the introduction of foundational technologies, advances in DNA sequencing, and an increased focus on precision medicine and AI applications

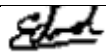
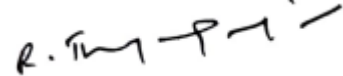
The proposed course outcomes were discussed and found to align well with the objectives. The emphasis on critical thinking through case studies and the integration of AI in healthcare was appreciated.

The new syllabus for SCHA1411, Chemical Reaction Engineering, was presented by Dr. Sathish Kumar, the course coordinator.

A detailed comparison of unit-wise changes between the old and new syllabus was presented. The emphasis on fundamental concepts, modern applications, and integration of catalysis and industrial bioreactors in the new syllabus was appreciated.

Resolutions: The course outcomes for the new course, SBTA4005: Bioentrepreneurship in Biotechnology and revisions to the syllabus SBTA3005: Medical Biotechnology and SCHA1411: Chemical Reaction Engineering, were reviewed and unanimously approved the Board of Studies.

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. Jayshree Nellore	Professor	
Dr.Thyagarajan	Professor	



Dr.Ramesh Kumar.V

Head of the Department

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SBTA4005	BIOENTREPRENEURSHIP IN BIOTECHNOLOGY	L	T	P	EL	C	Total Marks
		3	0	0	0	3	100

COURSE OBJECTIVE

- Introduce students to the principles and concepts of bioentrepreneurship, and how it relates to the life sciences and biotechnology sectors.
- To develop students' understanding of the process of identifying and evaluating entrepreneurial opportunities in the bioindustry.

UNIT 1: INTRODUCTION TO ENTREPRENEURSHIP

9 Hours

Definition of Entrepreneurship and start up, Types of Entrepreneurships, Essential entrepreneurs' skills, Process of Entrepreneurship, Current status of start-up process registration in India, Start-up Agencies in India.

UNIT 2: PRODUCTION OF MUSHROOM

9 Hours

Definition of mushroom, classification, life cycle of Oyster mushroom, Type of Mushrooms: Oyster mushroom, Milky mushroom, Reishi. Mushroom production: Substrates, sterilization methods, Process, Value added products, scenario of mushroom cultivation in India.

UNIT 3: PRODUCTION OF SERICULTURE AND API CULTURE

9 Hours

Definition of Sericulture, Moriculture, silkworm life cycle and rearing, reeling. scenario of sericulture in India.

Definition of Apiculture, Classification of Honey bee, life cycle, role of honey bee: Drone, Queen, Worker. Harvesting boxes, Extracting Products, apiculture byproducts, scenario of Apiculture in India.

UNIT 4: PRODUCTION OF SPIRULINA AND VERMICOMPOSTING

9 Hours

Definition of SCP, classification of Spirulina, Life cycle, Nutritional Profile and benefits, Production Process and Harvesting methods. Value added products, scenario of Spirulina cultivation in India. Definition of Vermicomposting, Substrates for vermicomposting, Production Process, applications. scenario of Vermicomposting in India

UNIT 5: PRODUCTION OF SEA WEEDS

9 Hours

Classification of Seaweed, Life cycle, Benefits of seaweed, Production Process: Seed Material, methods of Farming, Harvesting Methods, value added products, scenario of Scenario of sea weed farming in India.

Total hours: 45

COURSE OUTCOMES:

- CO1. - Describe the importance of Entrepreneurship
- CO2. - Summarize the process of initiating start ups
- CO3. - Demonstrate the cultivation of mushroom
- CO4. - Analyse the effectiveness of Apiculture
- CO5. - Appraise the process of Vermicompost technology
- CO6. - Evaluate the value products of seaweeds.

TEXT / REFERENCE BOOKS

1. Biotech Consortium India Ltd, Resource book, 2018.
2. Suman B.C and Sharma V.P, Mushroom cultivation In India,2007.
3. Madhan Mohan Rao,M, An Introduction to Sericulture , 2nd Edition, BS Publications.2019.
4. Jayashree K.V, Thara Devi C.S, Arumugam N, Apiculture,SaraS Publications, 2014.
5. KarthiKeyan, Spirulina formula for starting harvest,2022.
6. Seetha Lekshmy, Santhi R, Vermitechnology, SaraS Publications, 2012.
7. Bruno Augusto Amato Borges, Seaweed Cultivation, Del Publishing, 2017.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max.Marks:100

Exam Duration: 3Hrs.

PartA:10 Questions of 2marks each-No choice

20 Marks

PartB:2 Questions from each unit of internal choice, each carrying 16marks

80 Marks

SBTA3005	Medical Biotechnology	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course objectives:

The course will provide students with an historical perspective in the fast emerging medical biotechnology and the innovative processes that ensures the success of such endeavors.

- Enable students to comprehend the historical evolution of medical biotechnology, emphasizing key milestones and the evolution of biotechnological applications in medicine.
- Develop an understanding of foundational technologies and advancements in genomics, DNA sequencing, and the integration of artificial intelligence in medical diagnostics.

Unit 1: **BASIC CONCEPTS AND TOOLS** **Foundations of Medical Biotechnology** 9 Hrs. **Understanding**

human body, Genomics, Proteomics, Genetic disorders, Drugs, Pharmacogenomics, Pharmacokinetics. Historical Overview of Medical Biotechnology, Evolution of biotechnological applications in medicine Milestones in medical biotechnology, Genomic applications in medical research, Technology Fundamentals in Medical Biotechnology, Key Genomic Technologies in Medical Biotechnology Advances in DNA Sequencing: Next-generation sequencing technologies, Case studies in genomics and assay trouble-shooting, Integration of genomics into medical diagnostics

Unit 2: **SIGNALING MECHANISMS** **Mechanistic Understanding of Diseases** 9 Hrs. **Receptor**

mediated signal transduction – primary messenger – hormones and drugs- secondary messenger and neurotransmitters. G- Protein coupled receptors – cyclic AMP –calcium ions – Nitric oxide (NO) – prostaglandin and inositol triphosphates. Aetiology and Pathogenesis of Diseases: Molecular insights into disease development, Diagnostic laboratory techniques for identifying causal factors. Clinical Laboratory Diagnosis: Techniques for detecting specific disease markers, Customized treatments targeting underlying causes

Unit 3: **DIAGNOSTICS** **Molecular Biomarkers in Medical Diagnostics** 9 Hrs. **Hematology,**

Biochemistry (Serum & Tissue), Histology (Biopsy and Autopsy) and Endocrinology. Diagnosis of Bacteria (Mycobacterium), DNA virus (HBV/H1N1), RNA virus (HIV/HCV), Parasite (Malaria). Types of Molecular Biomarkers: Macromolecules and metabolites as diagnostic indicators, Collection methods for various biomarkers. Technologies for Biomarker Measurement: Next-generation sequencing (NGS) applications, Biomedical informatics and systems biology for data analysis

Unit 4: **TREATMENT AND PREVENTION** **Precision Medicine in Medical Biotechnology** 9 Hrs. **Traditional**

medicine (AYUSH), Chinese and Modern medicine, Antibacterial, Antiviral, Antibiotics, use of interferon, immunomodulators. Active and passive immunization, vaccines and toxoids, Food as medicine-Nutraceuticals. Precision Molecular Diagnostics: Companion diagnostics in medical biotechnology, Predicting therapeutic efficacies for targeted treatments. Personalized Drug Therapies: Cost-effective and safe use of individual drugs, Combination therapies in the clinical care setting

Unit 5: **THERAPEUTIC DEVELOPMENTS AND DRUG DESIGNING** **Role of AI in Advancing Medical Biotechnology**

9 Hrs.

Basics of Regenerative medicine, Nanomedicine, Combinatorial antibody designing, Gene therapy, Anti sense therapy RNAi. Drug designing process, receptor–ligand interaction, ligand docking-Bioinformatics tools.

AI Applications in Healthcare: Cognitive Systems in healthcare, AI for cancer detection and diagnosis Predictive Analytics in Medical Biotechnology: Text Analytics for biomedical data interpretation, Image Analytics and its role

in medical diagnostics. Case Studies: AI in Precision Diagnosis, IBM Watson and its applications in medical biotechnology, Future trends and challenges in AI-driven medical research

COURSE OUTCOMES: On completion of course, student will able to

CO1 - Develop an ability to use appropriate knowledge to identify and analyze the molecular basis of disease & emerging technology.

CO2 - Conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions

CO3 - Design solutions for complex, open-ended problems that meet specified needs with appropriate attention to health and safety risks

CO4 - Create, select, apply, adapt, and extend appropriate techniques, resources, and modern tools CO5 - Work effectively as a member and leader in teams, preferably in a multi-disciplinary setting

CO6 - Address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge in Medical & Pharmaceutical fields

CO1: Understand the historical evolution and technological advancements in medical biotechnology.

CO2: Comprehend the molecular insights into disease development and diagnostic laboratory techniques.

CO3: Identify and analyse molecular biomarkers, including collection methods and measurement technologies.

CO4: Demonstrate competence in precision molecular diagnostics, personalized drug therapies, and combination therapies.

CO5: integrate AI in healthcare, gaining proficiency in cognitive systems, predictive analytics, and data interpretation.

CO6: Apply critical thinking through the analysis of case studies, focusing on AI applications and future trends in medical biotechnology

TEXT BOOKS/REFERENCES

1. Reinhard Renneberg, Biotechnology for Beginners, Wiley-VCH, 2013
2. Bernard R. Glick, Jack J. Pasternak, and Cheryl L. Patten, Molecular Biotechnology: Principles and Applications of Recombinant DNA, ASM Press, 2019
3. Judit Pongrácz and Mary Keen, Medical Biotechnology, Churchill Livingstone Elsevier, 2009
4. T.A. Brown, Genomes, Garland Science, 2019
5. D. Peter Snustad and Michael J. Simmons, Principles of Genetics, Wiley, 2021
6. Lothar Thomas, Clinical Laboratory Diagnostics: Use and Assessment of Clinical Laboratory Results, THIEME, 2015
7. Arthur M. Lesk, Introduction to Genomics, Oxford University Press, 2017
8. Marschall S. Runge and Cam Patterson, Principles of Molecular Medicine, Humana Press, 2006
9. Adam Bohr and Mark Musen, Artificial Intelligence in Medicine, Academic Press, 2020

Red: deleted topics **Green:** added topics

SCHA1411	CHEMICAL REACTION ENGINEERING	L	T	P	Credits	Total Marks
		3	0	0	3	100

Course Objective:

To impart basic knowledge on the principles of different kinds of reaction, reaction kinetics and to introduce various types of reactors that are used in Chemical Engineering operations.

To enable the students to understand the kinetics of ideal reactors

To impart knowledge on various industrial reactors and catalytic reactions

UNIT I CHEMICAL KINETICS INTRODUCTION TO REACTION ENGINEERING 9Hrs.

Introduction to reactor, reaction system, chemical kinetics, rate equation, Elementary and non- elementary reactions. Molecularity and order, dependence of rate on concentration, temperature dependent term of a rate equation, concept of activation energy -Arrhenius theory, collision theory, transition state theory, determination of rate equation for nonelementary reactions. Methods to determine order of a reaction- Integral & differential method of analysis of data, Half-life method & Ostwald's isolation method.

UNIT II CHEMICAL KINETICS IDEAL REACTORS 9Hrs.

Dependence of rate on concentration, methods to determine order of a reaction- Integral method of analysis of data and differential method of analysis of data, Half life method, constant and variable volume reactions.

Introduction to Batch reactor, semi batch reactor, Plug flow reactor, Mixed flow reactor, Packed bed reactor, Concept of ideal flow, space time and velocity, performance or design equations for batch reactor, Plug flow reactor, Mixed Flow reactor.

UNIT III DESIGN OF MULTIPLE REACTOR SYSTEMS DESIGN OF IDEAL REACTORS 9Hrs.

Concept of ideal flow, Material balance, batch operation, continuous operation, space time and velocity, performance or design equations for Batch reactor, Plug flow reactor, and Mixed Flow reactor

Mixed flow reactors in series and parallel connection, Plug flow reactors in series and parallel connection, reactors of different types in series, size comparison of reactors using performance charts.

UNIT IV IDEAL AND NON-IDEAL FLOW INDUSTRIAL BIOREACTORS 9Hrs.

Fed batch reactor, Stirred tank reactor, Packed bed reactor, Air-lift bioreactor, membrane reactor, photo-bioreactor, tower reactor, biotechnology applications.

Reason for non ideality, Residence time distribution, E curve, F curve, relationship between E and F curve, relationship between mean residence time and space time, State of aggregation- micro and macro fluid, Earliness or lateness of mixing, basic models for non ideal reactor like tanks in series mode

UNIT V CATALYSIS 9Hrs.

Homogenous and Heterogeneous Catalysis, Enzyme catalysis, Michaelis- Menten Equation, Surface area, Pore volume, Catalyst preparation, Promoters, Inhibitors and Poisons, Catalyst deactivation and regeneration

Introduction to catalysis, catalytic reactions, Physical properties of catalyst: Surface area (BET isotherm), Pore volume distribution; Steps in a catalytic reaction, rate of catalytic reaction (adsorption, surface reaction and desorption as rate limiting steps).

Max.45Hrs.

References:

1. Chemical Reaction Engineering, Octave Levenspiel, John Wiley & Sons, Singapore, 3rd edition, 2000.
2. Chemical Engineering Kinetics, Smith J. M., McGraw Hill, N Y, 3rd edition, 1981.
3. Elements of Chemical Reaction Engineering, Fogler H.S., Prentice-Hall, NJ, 4th edition, 2006.
4. Bioreactors analysis and design, T Panda, Tata McGraw Hill, New Delhi, New York, 2011

Course outcomes

On completion of the course, student will be able to

CO1: Express the rate of reaction and to calculate the rate constant

CO2: Determine order of reaction by integral or differential method

CO3: Design performance equations for ideal reactors

CO4: Estimate the level of non-ideal behavior of reactors

CO 5: Analyze various preparation and characterization methods of catalysts

CO 6: Demonstrate the catalytic behavior of enzymes on substrates

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max.Marks:100

PartA:10 Questions of 2marks each-No choice

PartB:2 Questions from each unit of internal choice, each carrying 16marks

Exam Duration:3Hrs.

20Marks

80Marks

Red: deleted topics **Green:** added topics

SBBA1602	RESEARCH METHODOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- This course aims at understanding the research terminology.
- Be aware of the ethical principles of research, ethical challenges and approval processes.
- Describe quantitative, qualitative and mixed methods approaches to research.
- Identify the components of a literature review process. Critically analyze published research.

UNIT1 STATISTICAL METHODS BASIC CONCEPTS OF RESEARCH 9 Hrs.

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.

Research-definition and types of research. Research methods vs methodology, Literature-review and its consolidation, Problem Identification & Formulation, Research Questions and hypothesis.

UNIT 2 RESEARCH DESIGN AND SAMPLING

9 Hrs.

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.

UNIT 3 ANALYTICAL METHODS AND SPECTROSCOPY RESEARCH RESOURCES

9 Hrs.

Principles of biophysical methods used for analysis. X-ray diffraction, Fluorescence, UV-VIS, ORD/CD, NMR and ESR spectroscopy, Hydrodynamic methods, Atomic absorption, Plasma emission spectroscopy.

Sources of information. Literature search. World Wide Web, Online data bases – search tools. Literature review – Case studies, review articles and Meta analysis – Role of the librarian. Ethical and moral issues in Research, Plagiarism, tools to avoid plagiarism.

UNIT 4 MOLECULAR TECHNIQUES FOR BIOTECHNOLOGY RESEARCH WRITING

9 Hrs.

Principles and techniques of nucleic acid hybridization and dot curves, sequencing of proteins and nucleic acids, southern, northern and south-western blotting techniques, PCR, methods for measuring nucleic acids and protein interactions. Layout of a Research Paper, Proposal submission for funding agencies, Elements of Style. Organization of proposals, Basic knowledge of funding agencies, Research report writing, Communication skills.

UNIT 5 RADIO LABELLING AND ANALYSIS TOOLS FOR RESEARCH

9 Hrs.

Principles and applications of tracer techniques in biology, radiation dosimetry, radio-active isotopes and half-life of isotopes, effect of radiation on biological systems, autoradiography, Cerenkov radiation and liquid scintillation spectrometry.

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.

Max. 45 Hours

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand and articulate the fundamental concepts of research, including its definition, various types, and the distinction between research methods and methodology.

CO2 - Demonstrate the ability to critically evaluate research designs, including the nature and classification of research designs, data classification, and the selection of appropriate sampling methods.

CO3 - Develop proficiency in accessing and utilizing diverse sources of information, conducting literature searches, and navigating online databases and search tools.

CO4 - Exhibit awareness of ethical and moral considerations in research, including issues related to plagiarism, and understand the role of a librarian in supporting ethical research practices.

CO5 - Acquire skills in research writing, including the layout of a research paper, proposal submission for funding agencies, and the organization of proposals. Develop effective communication skills for presenting research findings.

CO6 - Gain practical competence in utilizing tools and techniques for research, including effective methods for information retrieval, proficiency in using reference management software like Zotero/Mendeley, familiarity with software for paper formatting (e.g., LaTeX/MS Office), and awareness of tools for detecting plagiarism.

TEXT BOOK / REFERENCE BOOK

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Ganesan R, Research Methodology for Engineers, MJP Publishers, Chennai. 2011

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: 10 questions of 2 marks each - No choice

20 Marks

PART B: 2 questions from each unit of internal choice; each carrying 16 marks

80 Marks

Red: deleted topics **Green:** added topics