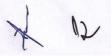# AMITY UNIVERSITY
— RAJASTHAN —

Amity Institute of Biotechnology -Minutes of Board of Studies

2020-2021

Minutes -BoS in M.Sc. (Food Technology)

28-05-2021

Item	Existing	Proposed	Remarks/ Justification
Inclusion of ANANDAM course in following w.e.f. July 2020 admission batch onwards M.Sc. (Food Tech)	Not applicable	Inclusion of Anandam course with 2 credits as follows: B. Tech Food Tech (Sem I-VII) M.Sc. Food Tech (Sem I-III)	As per the guidelines of Rajasthan Govt. **Anandam course** added in NTCC (CC) category Please see annexure 1
Change in evaluation scheme for M.Sc. FT 3rd Sem	30 (Internal) : 70 (External)	50 (Internal) : 50 (External) Courses are :- MSD 301 (Processing of Foods of Plant Origin) MSD 302 (Novel Food Packaging Technology) MSD 303(Food Safety and Quality Management) MSD 304 (Advance Dairy Technology) MSD 330 (Food Business Management) MSD 331 (Food Toxicology) MSD 332 (Process Equipment Design and Plant Layouts)	Please see annexure 1
Change in course code from MTB to MSD	MTB131 (IPR & Food regulatory affairs) MTB 132(Industrial Safety & Hazards) MTB 232 (Advance Nanotechnology and	MSD 131 (IPR & Food regulatory affairs) MSD 132 (Industrial Safety & Hazards) MSD 232 (Advance Nanotechnology and	Please see annexure 1

	its Applications in Food Industry)	its Applications in Food Industry)	
Revision in Course content of the following programs: **M.Sc. Food Tech**	MSD 103	Please see annexure 2	As per recommendations of the IAC
Introduction of Non-credit courses as follows: Science Community Nutrition: M.Sc. Food Tech (MSD 001)	N.A.	Please see annexure 3&4	As per NAAC – Criterion 1.3.2 - N C Courses (Non Credit Courses) of Minimum 30 hrs

Annexure 2

Program & Semester	MSc FT 1ˢᵗ sem
Course Code	MSD 103
Course Title	INSTRUMENTAL METHODS OF FOOD ANALYSIS
Existing Content	**Module I** Sampling techniques; Water activity, its measurements and significance in food quality; Calibration and standardization of different instruments. **Module II** Spectroscopic techniques using UV/Vis, fluorescence, IR spectroscopy, atomic absorption spectroscopy, polarimetry, refractometry, microscopic techniques in food analysis (SEM, TEM, XRD, particle size analysis). Module III Chromatographic techniques: Adsorption, column, partition, affinity, ion exchange, size exclusion, GC, GLC, HPLC, HPTLC, GCMS, LCMS. **Module IV** Separation techniques: Gel filtration, dialysis, electrophoresis, sedimentation, ultrafiltration and ultracentrifugation, solid phase extraction, supercritical fluid extraction, isoelectric focusing. **Module V** Immunoassay techniques; biosensors; thermal methods of food analysis (Differential scanning colorimetry and Differential thermal analysis).
Proposed Content	Module I Sampling techniques; Water activity, its measurements and significance in food industry **Module II** Spectroscopic techniques using UV/Vis, fluorescence, atomic absorption spectroscopy, polarimetry,& refractometry (Application in Food Industry) Module III Chromatographic techniques: Adsorption, column, partition, affinity, ion exchange, size exclusion, GC, GLC, HPLC, HPTLC, GCMS, LCMS and significance in food industry. **Module IV** Electrophoresis, solid phase extraction, isoelectric focusing. **Module V** Immunoassay techniques; biosensors; Enzyme linked immunosorbent assay (Application in Food Industry)
Justification	Content as per the credit

AMITY UNIVERSITY RAJASTHAN
Amity Institute of Biotechnology
Suggestions/Changes in the existing course syllabus

<u>Date: 11-05-2021</u>

Program & Semester	B.Tech. Bioinformatics, 7th Semester
Course Code	Old BTF-701/BTF-703 New- BTF-701
Course Title	**Old-BIOINFORMATICS ALGORITHMS** /Python and MATLAB **New-BIOINFORMATICS ALGORITHMS, PYTHON & MATLAB**
Existing Content	**BIOINFORMATICS ALGORITHMS** **Course Code: BTF 701** **Credit** **Units: 03** **Course Objective:** The objective of this course is to provide exposure to students to the broad range of algorithms in the field of bioinformatics. It is important to acquire a knowledge of the algorithms employed in various software systems to understand and evaluate them rather than just use them. **Course Contents:** **Module I** Introduction to algorithms, Difference between – Biological vs Computer algorithms, Correct vs Incorrect algorithms, Iterative vs Recursive algorithms, Fast vs Slow algorithms, Tractable vs Intractable problems. **Module II** Big-O notation, Brief about the different types of algorithm design techniques (Exhaustive search, Branch-and-Bound algorithms, Greedy algorithm. **Module III** Dynamic programming, Divide-and-Conquer algorithms, Machine Learning, Randomized algorithms. **Module IV** Neural Network, Hidden Markov Models. SVM, Random Forest, and Various other Classifiers. **Module V** Dynamic programming – its background (sequence alignment – local, global, Gap penalties, scoring of alignments), Needleman-Wunch algorithm, Smith-Waterman algorithm.

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield. Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and
  B.F.F. Quellette. Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor Laboratory Press.
- Essentials of Genomics and Bioinformatics – by C.W. Sensen. John Wiley and Sons
- Introduction to Bioinformatics by T. Attwood and D. Parry-Smity. Prentice Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Triviabl Pursuit by G. Von Heijne and
  G. Von Heijne. Academic Press.

PYTHON AND MATLAB

Course Code: BTF703   **Credit Units:**

04

Course Objective:

The objective is to understand basics of Python and perform advance programming in Python for bioinformatics how use handle large files and databases to extract information by using various modules of Python programming. Apart from Python Programming Introduction and application of MATLAB

Course Contents:

Module I

Course Introduction, Introduction to scripting, An Introduction to Python, Numbers and operators, Testing Python Scripts, Variables and Data types.

Module II

Complex data types: strings, tuples (Accessing tuples, Operations, Working, Functions and Methods), lists, and dictionaries (Accessing values in dictionaries, Working with dictionaries, Properties, Functions).

Module III

Decisions and Loops, Functions, Objects and Classes, Modules: Importing module, Math module, Random module,Packages, Composition,

Module IV

Advanced Python testing, File Access: Printing on screen, reading data from keyboard, Opening and closing file, Reading and writing files, Functions,

Module V

Text processing and Regular Expressions, Application of Python on machine learning, Accessing Databases, working with Biopython modules, Network Programming, Web applications.

Module VI
MATLAB: Introduction to MATLAB: Installation, Getting used to the environment, Application and usages, MATLAB - Basic Syntax, MATLAB – Commands

Module VII
MATLAB – Operators, MATLAB - Data Import, MATLAB - Data Output, MATLAB – Plotting, MATLAB – Graphics.

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References:
- Patrick O'Brien, Beginning Python for Bioinformatics, O'Reilly, 2002.
- Alex Martelli, Python in a Nutshell, O'Reilly, 2006.
- Cynthia Gibas, Per Jambeck, Developing Bioinformatics Computer Skills, O'Reilly, 2001.
- Harvey M. Deitel, Python: How to Program, Prentice Hall, 2002

Proposed Content

BIOINFORMATICS ALGORITHMS, PYTHON & MATLAB

Course Code: BTF 701   **Credit Units:04**

Course Objective:
The objective of this course is to provide exposure to students to the broad range of algorithms in the field of bioinformatics. It is important to acquire a knowledge of the algorithms employed in various software systems to understand and evaluate them rather than just use them. This course also provide exposure to MATLAB, MATLAB includes diverse application in research and industries.

Course Contents:

Module I
Introduction to algorithms, Difference between – Biological vs Computer algorithms, Correct vs Incorrect algorithms, Iterative vs Recursive algorithms, Fast vs Slow algorithms, Tractable vs Intractable problems.

Module II
Big-O notation, Brief about the different types of algorithm design techniques (Exhaustive search, Branch-and-Bound algorithms, Greedy algorithm.

Module III
Dynamic programming, Divide-and-Conquer algorithms, Machine Learning, Randomized algorithms.

Module IV
Advanced Python testing, File Access: Printing on screen, reading data from keyboard, Opening and closing file, Reading and writing files, Functions,

Module V
Text processing and Regular Expressions, Application of Python on machine learning, Accessing Databases, working with Biopython modules, Network Programming, Web applications.

Module VI
MATLAB: Introduction to MATLAB: Installation, Getting used to the environment, Application and usages, MATLAB - Basic Syntax, MATLAB – Commands

Module VII
MATLAB – Operators, MATLAB - Data Import, MATLAB - Data Output, MATLAB – Plotting, MATLAB – Graphics.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield. Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and
    B.F.F. Quellette. Wiley – interscience.
- Bioinforamtics: Sequence and Genome Analysis by D.W. Mount. Cold Spring Harbor Laboratory Press.
- Essentials of Genomics and Bioinformatics – by C.W. Sensen. John Wiley and Sons
- Introduction to Bioinformatics by T. Attwood and D. Parry-Smity. Prentice Hall
- Sequence Analysis in Molecular Biology: Treasure Trove or Triviabl Pursuit by G. Von Heijne and
    G. Von Heijne. Academic Press.

Justification	Python is also taught in 4th semester and there was a need of adding a new paper on the proposal of the IAC council. Thus without affecting the curriculam and increasing credit for this paper we have added a new paper on Enterpreneur Development.

Name of Subject Expert: Dr. Ravi Ranan Kumar
Neeraj and Dr. Nidhi Mathur Date & Sign:

11/05/2021

AMITY UNIVERSITY RAJASTHAN

Amity Institute of Biotechnology

Suggestions/Changes in the existing course syllabus

Date:--------------

Program & Semester	B.Tech. BI-VII sem
Course Code	BTF723
Course Title	Bioinformatis Algorithms ,Python and Matlab-LAB
Existing Content	**SAS (STATISTICAL ANALYSIS SYSTEM) AND MATLAB LAB** **Course Contents:** **Module I** Analysis using SAS **Module II** Analysis using Matlab on Bioinformatics toolkit
Proposed Content	**BIOINFORMATICS ALGORITHM, PYTHON & MATLAB-LAB** **Module I** Installation and getting use to environment, Analysis using PYTHON: Working with dictionaries and tuples. File access, working on string, Nucleotide count, Protein analysis using python. **Module II** Installation and Analysis using Matlab on Bioinformatics toolkit: MATLAB - Data Import, MATLAB - Data Output, MATLAB – Plotting, MATLAB – Graphics.
Justification	Due to change in theory subject course content

Name of Subject Expert: Dr Nidhi Mathur

BIOINFORMATICS ALGORITHMS, PYTHON & MATLAB

Course Code: BTF 701   **Credit Units:04**

Course Objective:

The objective of this course is to provide exposure to students to the broad range of algorithms in the field of bioinformatics. It is important to acquire a knowledge of the algorithms employed in various software systems to understand and evaluate them rather than just use them. This course also provide exposure to MATLAB, MATLAB includes diverse application in research and industries.

Course Contents:

Module I
Introduction to algorithms, Difference between – Biological vs Computer algorithms, Correct vs Incorrect algorithms, Iterative vs Recursive algorithms, Fast vs Slow algorithms, Tractable vs Intractable problems.

Module II
Big-O notation, Br ief about the different types of algorithm design techniques (Exhaustive search, Branch-and-Bound algorithms, Greedy algorithm.

Module III
Dynamic programming, Divide-and-Conquer algorithms, Machine Learning, Randomized algorithms.

Module IV
Advanced Python testing, File Access: Printing on screen, reading data from keyboard, Opening and closing file, Reading and writing files, Functions,

Module V
Text processing and Regular Expressions, Application of Python on machine learning, Accessing Databases, working with Biopython modules, Network Programming, Web applications.

Module VI
MATLAB: Introduction to MATLAB: Installation, Getting used to the environment, Application and usages, MATLAB - Basic Syntax, MATLAB – Commands

Module VII
MATLAB – Operators, MATLAB - Data Import, MATLAB - Data Output, MATLAB – Plotting, MATLAB – Graphics.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:

- Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology by D. Gusfield. Cambridge University Press
- Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by A.D. Baxevanis and B.F.F. Quellette. Wiley – interscience.

R Prog ramming

Course Code: BTF 704   **Credit Units: 04**

Course Objective:
R package provides a complete, comprehensive set of tools that can meet the data analysis needs. The course is designed to familiarize students with the skills necessary to produce simple reports and data sets as well as providing an understanding of how R analyses and views data. The students will also work on R which is a language and environment for statistical computing and graphics. provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, ...) and graphical techniques, and is highly extensible

Course Contents:

Module I: R
Introduction and preliminaries of R, R-packages, Basic Syntax, Data Type, Variables, Operators, numbers and vectors

Module II:
Objects, their modes and attributes, Ordered and unordered factors, Arrays and matrices, Lists and data frames,

Module III:
R- Charts and Graph: Pie Chart, Bar chart, Histogram, Line Graph, Scattered Graph

Module IV:
R - Mean, Median & Mode, R - Linear Regression, R - Multiple Regression, R - Logistic Regression,

Module V:
R - Normal Distribution, R - Binomial Distribution, R - Poisson Regression.

Module VI:
R - Analysis of Covariance, R - Time Series Analysis, R - Nonlinear Least Square,

Module VII:
R - Decision Tree, R - Random Forest, R - Survival Analysis, R - Chi Square Tests

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:
Text:
- Joshua F. Willey and Larry A Pace (2015), Beginning R, Second Addition, Publisher(s): Apress ISBN: 9781484203736

References:
- Garrett Grolemund (2014)Hands-On Programming with R , Publisher: O'Reilly Media, Inc.ISBN: 9781449359010

BIOINFORMATICS ALGORITHM, PYTHON & MATLAB-LAB

Course Code: BTF 723   **Credit Units: 01**

Course Contents:

Module I

Installation and getting use to environment, Analysis using PYTHON: Working with dictionaries and tuples. File access, working on string, Nucleotide count, Protein analysis using python.

Module II

Installation and Analysis using Matlab on Bioinformatics toolkit: MATLAB - Data Import, MATLAB - Data Output, MATLAB – Plotting, MATLAB – Graphics.

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
30	15	05	20	10	10	10

R- Programming LAB

Course Code: BTF 724   **Credit Units: 01**

Course Contents:

Module I
Statistical Analysis using R, Regression, Testing methods (Z Test, F Test, T Test, Chi Square test)

Module II
R-Chart and Graphs

Examination Scheme:

IA			EE			
Class Test (Practical Based)	Mid Term Viva	Attendance	Major Experiment	Minor Experiment/Spotting	Practical Record	Viva
30	15	05	20	10	10	10

ENTREPRENEURSHIP DEVELOPMENT

Course Code: BTF703   *Credit Units: 03*

Course Objective:
The Management and Entrepreneurship program is designed to prepare students for an exciting career in today's competitive era.
The course will equip students with the knowledge to cope up with the changing environment because of the advent of technology and other influences. The course will also develop required entrepreneurship skills in the students from a variety of disciplinary perspectives known to be important for independent and corporate entrepreneurs.

Course Contents:
Module I
Principles and function of management, Planning and decision making, Line and staff relationship, management by objective.

Module II
Formal and informal organization, Performance appraisal, Training and development.

Module III
Entrepreneurship and entrepreneurial process, Business plan, Form of ownership suitable for business.

Module IV
Entrepreneurial motivation and leadership, entrepreneurial competencies, entrepreneurial development programme.

Module V
Project Finance: Need for finance, sources of finance (BIRAC- various programs), Venture capital, Nature and Overview, Venture capital process, locating venture capitalists.

Examination Scheme:

Components	Mid Term	Attendance	Assignment/ Project/Seminar/Quiz	Class Test	Viva	EE
Weightage (%)	15	5	10	10	10	50

Text & References:
Text:
- Essentials of Management, H. Koontz, H. Weihrich and C. O'Donnell, McGraw-Hill/Irwin
- David H Holt, Entrepreneurship : New Venture Creation

References:
- The Practice of Management, P. Drucker, Harper Business

	• Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd. • Cell Growth and Division – A Practical approach, R. Basega, IRL Press • Culture of Animal Cells, R.I Freshney, Wiley-Leiss
Proposed Content	ANIMAL BIOTECHNOLOGY **Course Code:** BTB 504 **Credit Units: 03** **Course Objective:** **Course Contents:** **Module I** Historical perspectives, sterilization methods, organ culture - culture techniques, plasma clot, raft methods, agar gel, grid method, organ engineering. Cell culture substrates, cultural media, natural and artificial media, initiation and maintenance of cell cultures, cell culture products, cryopreservation techniques, immobilized cultures. **Module II** In vitro fertilization, Embryo transfer, Steps, Advantages and Disadvantages; Somatic cell hybridization, Monoclonal antibody, Hybridoma technology for monoclonal antibody production **Module III** Animal genetic engineering, Types of vectors, Gene transfer methods – Viral based (Adenovirus, Lentivirus, Retrovirus, Adeno associated virus), Non-viral based (Microinjection, Liposome, Electroporation, Nucleofection) methods of gene transfer **Module IV** Transgenic animal production, Steps, Advantages, Disadvantages, Transgenic animals as bioreactors for producing pharmaceutically important compounds and therapeutic etc. **Module V** Bioethical issues related to animal biotechnology (In vitro fertilization, Embryo transfer, Transgenic animals). **Examination Scheme:**

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss

Module VI
Animal disease diagnosis and prevention should be incorporated
Animal diseases, Laboratory Diagnosis of Infectious Diseases, Host pathogen interaction, Immunological methods for diagnosis, Nucleic Acid Based Assays, Biomarkers for animal disease diagnosis, Vaccines for prevention of diseases

Examination Scheme:

Components	CT	Attendance	Assignment/ Project/Seminar/Quiz	EE
Weightage (%)	15	5	10	70

Text & References

- Cell Culture LabFAx, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss

Justification	Animal disease and prevention is an important topic to be taught to graduate students

Name of Subject Expert: Dr Anupam Jyoti

Date & Sign: 11/05/2021