॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

25
1994 - 2019
SILVER JUBILEE YEAR

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे **CBCS Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४–२०१९** च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात येत आहेत.

1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B.Voc. (Food Processing, Preservation and Storage)
6. B.Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechonology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.

जा.क्र.: शैक्षणिक–०१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/
२०१९–२०/२९२

दिनांक : ०३.०७.२०१९.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :

१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SYLLABUS B.Sc. BIOINFORMATICS
CHOICE BASED CREDIT SYSTEM (June 2019)

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
I	AECBI-IA	Functional English	4	AEC	4	75	25	100
	CCBI- 1A	Introduction to Bioinformatics	4	CC	4	75	25	100
	CCBI-2A	Basics of Biological Sciences	4	CC	4	75	25	100
	CCBI-3A	Microbiology and Cell Biology	4	CC	4	75	25	100
	Lab course I	Practicals based on AECBI 1A and CCBI1A	03+03	PR	4	100		100
	Lab course II	Practicals based on CCBI 2A and 3A	03+03	PR	4	100		100
					24	500	100	600

Semester	Code	Title of the Course	Hr/Week	Type of Course	Credit	Marks		Total
						ESA	CIA	
II	AECBI - 2A	Business Communication	4	AEC	4	75	25	100
	CCBI - 1B	Basics of Biochemistry	4	CC	4	75	25	100
	CCBI - 2B	Basics of Genetics	4	CC	4	75	25	100
	CCBI - 3B	Basics of Biocomputing	4	CC	4	75	25	100
	Lab Course III	Practicals based onAECBI2A and CCBI 1B	03 + 03	PR	4	100		100
	Lab course IV	Practicals based on CCBT 2B+ 3B	03 + 03	PR	4	100		100
					24	500	100	600

S. R. T. M. University, Nanded
B.Sc. Bioinformatics FY Syllabus (CBCS Pattern – 2019)
Functional English-AECBI-IA   **Maximum Marks: 75   Hours: 40   Credits: 4**

Learning Objective:
1. To enable students to utilize their knowledge of grammar effectively for communicative purposes.
2. To develop communicative skills of the learners in listening, speaking, writing and reading.
3. To focus on how English is used in real-life situations
4. To develop fluency in conversation and efficiency in interactional skills
5. To learn to use grammar communicatively so that they become effective and efficient communicators in English.

Learning outcome:
By the end of this course students should be able to:
1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit I:
Morphology   **10 Lectures**
1.1 Morphology: Free & Bound Morphemes
1.2 Word Formation Processes
1.3 Morphological Analysis of words
Unit II:
A. Grammar in day-to-day use: **10 Lectures**
2.1 Word Classes: Open and Closed Word Classes
2.2 Phrase: Types and functions of the phrases
B. Speaking Situations:
2.3 Role Playing
2.4 Group Discussion
2.5 Seminars
Unit III:
A. Error Detection   **10 Lectures**
3.1 Determiners: Article, Quantifiers and Demonstratives
3.2 Subject – Verb Agreement
B. Transformation of Sentences: -
3.4 Voice: Active & Passive
3.5 Speech: Direct & Indirect
Unit IV:
Business Correspondence   **10 Lectures**
4.1 Letters (Formal & Informal),
4.2 Report Writing (Scientific and Formal)
4.3 Essay Writing
4.4 Resume

B.Sc. Bioinformatics FY Syllabus

Introduction to Bioinformatics - CCBI-1A   **Maximum Marks: 75   Hours: 40   Credits: 4**

Objective:
To have overview and understanding of world of Bioinformatics with applications.
Outcome:
Students become able to understand the role and applications of Bioinformatics in different fields.

Unit -I: Introduction to Bioinformatics:
Various definitions of bioinformatics, history of bioinformatics, applications of bioinformatics, scope of bioinformatics, bioinformatics in business. Introduction to central dogma of molecular biology.
Unit -II: Internet and Bioinformatics:
General purpose search engine: Google, Biological search engine: Entrez, SRS. What is Database? Types of Databases Biological databases: Primary databases – GenBank, DDBJ, EMBL. Protein sequence databases – Swissprot, Uniprot, TrEMBL, Structural databases – PDB, PubChem, ChemBank,. Bibliographic databases:- Pubmed, PMC, PloS.
Unit -III: Human Genome Project and Biological data mining:
The Human Genome Project, Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, applications of data mining.
Unit -IV: Sequence and Molecular FileFormats:
Sequence File Formats, Molecular File Formats and file Conversion Tools
Introduction to advance fields of Bioinformatics:
Genomics, Proteomics, Transcriptomics, Metabolomics, Pharmacogenomics, Pharmacogenetics, Rational Drug Designing, CADD.
Reference Books:-
1. Bioinformatics Concepts Skills and Application-S.C. Rastogi- PHI
2. Essentials of Bioinformatics-Jin Xion- Cambridge
3. Introduction to Bioinformatics- Attwood & Parry Smith- Pearson
4. Bioinformatics-CSV Murthy-Himalaya
5. Introduction to Bioinformatics- Arthur M. Lesk, - Oxford University
6. Bioinformatics Computing- Bergeron- PHI
7. Discovering Genomics Proteomics and Bioinformatics- Campbell, Heyer- Pearson
8. Data mining: Introductory and advanced-Margeret H. Dunham- IE publisher
Practicals:-
1. Use of different browsers, search engines for desired data retrieval
2. Study of major bioinformatics companies in India and overseas
3. Explore the sitemap of NCBI. Study the resources available on NCBI.
4. Study format of Genbank entry data retrieval from Genbank
5. Retrieve the Genbank entry with Specific accession number
6. Retrieving Protein sequences from protein database
7. Sequence File Formats.
8. Molecular File Formats and file Conversion Tools
9. Visit and report on bioinformatics research institute/ company

B.Sc. Bioinformatics FY Syllabus

Basics of Biological Sciences - CCBI-2A   Maximum Marks: 75 Hours: 40 Credits: 4

Objective: To study and understand basic life forms and biodiversity
Learning outcome: students get knowledge about life forms and biodiversity

Unit-I: Bacteria
Morphology of Bacteria, Size and shape, Arrangements. Ultra Structure of bacterial cell: Cell wall, Cell membrane, Flagella cytoplasmic inclusions. Bacterial endospore, Bacterial Nutrition, Reproduction & growth curve

Unit-II: Fungi
General characteristics of fungi, Ultrastructure of typical fungal cell, hyphae structure, Nutrition (Saprophyte, parasitic, Symbiotic), Reproduction, Meiotic & Mitotic spores, dormancy population and colonization, effect of environment on growth, prevention of fungal growth. Types study-Yeast, Agaricus.

Unit-III: Virus
Biology of viruses, Bacteriophages, Replication of Virus, genome, General properties of virus: Morphology, Classification and Nomenclature of virus, Virus cell interactions.

Unit-IV: Algae
General characters, spirogyra spirulina, chlorella, cultivation and economic importance of algae.
Lichens Types or forms, external and internal structure, economical importance.

Reference Books:
1. General Microbiology- Powar and Daginawala- Himalay Publication
2 A textbook of Microbiology- R.C. Dubey and D.K. Maheshwari
3. An Introduction to Mycology- K.R.Aneja- New Age
4. An Introduction to Fungi- H.C. Dubey- Vikas
5. Fungi for Degree Students- Vashist- S.Chand
6. Microbiology- Pelczar- Tata McGraw Hill
7. An Introduction to Viruses- Biswas- Vikas
8. Viruses and Plant Diseases- Mishra- DPH

Practical:
1) General Rules and Safety in Microbiology Laboratory.
2) Study of basic requirements in Microbiology Laboratory
i) Autoclave ii) Hot air oven iii) Incubator
3) Isolation of microorganisms from soil, water and air.
4) Simple staining & Gram staining
5) External and internal structure of Yeast and Agaricus.
6) Types of lichens

B.Sc. Bioinformatics FY Syllabus

| Microbiology and Cell Biology - CCBI-3A | Maximum Marks: 75 | Hours: 40 | Credits: 4 |

Objective: To study and understand microbial forms of life and cell structure and function

Learning outcome: Students will learn the general microbes, Classification of microorganisms and cell structure and function.

UNIT I
Fundamentals & history of microbiology, Classification of microorganisms, microbial taxonomy, criteria used including molecular approaches, Microbial phylogeny and current classification of bacteria, structure of bacterial cell. Difference between gram positive and gram negative cell walls.

UNIT II
Cultivation and maintenance of microorganisms, nutritional categories of microorganisms, methods of isolation, purification & preservation of pure culture. Microbial growth, Growth curve, generation time, Synchronous, batch and continuous culture, measurement of growth and factors effecting growth.

UNIT III
Diversity of cell size and shape, cell theory, Origin of Life, Stanley Miller Experiment. Introduction to Prokaryotic and Eukaryotic Cell. Cell Structure and Organization: Biological membrane, cell organelles, Structure organization, Membrane proteins, lipids. Structure and functions of Cell Wall

UNIT IV
Transport across cell membrane, Simple diffusion, Passive transport, Active Transport. Na / K ion Channel. Cell cycle, General events at Mitosis and Meiosis

Text and Reference:
1. Cell biology -C. B.Powar; - Himalaya Pub
2. Cell Biology –V.K. Agarwal- S. Chand
3. General Microbiology- Powar & Daginawala- Himalaya
4. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology- Verma, Agarwal- S. Chand
5. Cell and Molecular Biology - Gerald Karp- John Willey
6. Cytology- Verma Agrawal- S. Chand
7. The World of The Cell-Becker- Person
8. Molecular cell Biology - Darnell, Lodish, Baltimore- WH Freeman
9. Cell Biology- David Sadava- Panima
10. Molecular Biology of The Cell- Albert Bruce- Garland Science

Practicals:
1. Microscopic observation & study of different types of Cells
2. Study of Osmosis (RBC's/ Chicken Egg/ Potato)
3. Sub cellular fractionation and isolation of organelles (Mitochondria, Chloroplast)
4. Study of Mitosis
5. Study of Meiosis
6. Study of Polytene Chromosome

B.Sc. Bioinformatics FY Syllabus

Business Communication - AECBI - 2A	**Maximum Marks: 75 Hours: 40 Credits: 4**

Objective:

1. To enable students to utilize their knowledge of grammar effectively for communicative purposes.
2. To develop communicative skills of the learners in listening, speaking, writing and reading.
3. To focus on how English is used in real-life situations
4. To develop fluency in conversation and efficiency in interactional skills
5. To learn to use grammar communicatively so that they become effective and efficient communicators in English.

Outcome:

1. Understand and demonstrate Basic English usages for their different purposes.
2. Clear entrance examination and aptitude tests.
3. Write various letters, reports required for professional life.

Unit-I: **10 Lectures**

Day-to-Day-English 10 Lectures

1.1 Describing persons, objects or things
1.2 Narrating Pictures
1.3 Talking about places and recipes
1.4 Expression opinions

Unit-II: Vocabulary   **10 Lectures**

2.1 Spellings: How to spell correctly
2.2. Idioms and Phrases
2.3 Synonyms and antonyms
2.4 One Word Substitution

Unit-III: **Reading Comprehension:**   **10 Lectures**

3.1 Basic Approaches for understanding English
3.2 Para Jumbles
3.3 Rearranging the jumbled parts of a sentence
3.4 Cloze Test

Unit-IV: Writing Ability   **10 Lectures**

4.1 Writing Research Papers- Introduction
4.2 Creative Writing- Writing Meeting Notices, Agenda and Minutes
4.3 Email Writing for day-to-day purpose: Emails for Jobs, Invitation and Complaint
4.4 Writing short moral stories

Reference Books:

1) Developing of Communication Skills -Krishna Mohan &Meera Banerji
2) A Practical English Grammar A.J. Thomson -Oxford
3) Mastering English Grammar – S.H.Burton
4) Technical Communication- Raman Sharma- Oxford
5) Written Communication in English – Sarah Freeman Orient Longman Pvt. Ltd.
6) A Course in Phonetics & Spoken English -J.Sethi & P.V.Dhamija.

List of Practical:

1) Preparing Individual Resume
2) Curriculum Vitae
3) Presenting Prepared Speeches
4) Handling Tele-interviews
5) Email Drafting, Cover Letter Writing and Sending error free emails
6) Organizing Conference and dealing with oral presentations
7) Art of Oratory and Video conferencing
8) Delivering speeches, lectures using technology like you-tube and other social media

B.Sc. Bioinformatics FY Syllabus

Basics of Biochemistry - CCBI -1B   Maximum Marks: 75   Hours: 40   Credits: 4

Objective: To understand basic Biomolecules and their role in life

Learning outcome: Students will learn the structure and function of cell biomolecules, Classification of molecules and their interactions.

Unit I: Introduction
Concept of Atom, Molecule, Biological molecules, molecular interaction as a basis of biological functions, Chiral interactions, Concept of Acid & Base, pH, pK, Buffers.

Unit II: Carbohydrates & Lipids
Definition, classification, structure, simple and complex carbohydrates, polysaccharides: structure and linkages in di and polysaccharides, glycoprotein, glycolipids, biological role of carbohydrates Lipids: structure of fatty acid, classification of lipids, properties & Role of lipids, lipoprotein

Unit III: Amino Acids
Classification, Structure and properties of amino acids, peptides, peptide bond, types of peptides, biologically important peptides.

Protein and Enzymes Classification of Proteins, Protein family, Structural level of protein, primary, secondary, tertiary and quaternary structure with examples Introduction, classification and nomenclature of enzymes, types of enzymes, Biological role of Enzymes

Unit IV: Nucleic Acids
Nucleoside, Nucleotides, Structures of nucleic acids; DNA & RNA. Forms of DNA, Types of RNA. Properties and biological Role of Nucleic Acids.

Reference Books:
1. Lehniger Biochemistry- Kalyani Publication
2. Biochemistry- Powar & Chatawal- Himalaya
3. Biochemistry- Rastogi- Tata Mcgraw Hill
4. Biochemistry- U. Satyanarayana & Chakrapani- New Age
5. Biochemistry- J.L Jain- S.Chand
6. Fundamentals of Biochemistry- A.C. Deb- Central publication
7. General Biochemistry- J.H. Weil- New Age

Practicals :-
1. General and Safety Rules of Laboratory
2. Study and care of glassware, instruments, planning and recording of experiment
3. Introduction to measurements, balance, burette, pipette, Standard flasks etc
4. Preparation of Standard solutions – Molar, Molal, Normal, Percent.
5. Identification of Bio molecules by Spot test.
6. Study of Lambert Beer's Law
7. Estimation of Carbohydrate by DNS Reagent.
8. Estimation of Protein by Biuret method.
9. Study of principle and working of pH meter and Standard Buffers.
10. Study and preparation of Distilled water.

Basics of Genetics - CCBI - 2B   Maximum Marks: 75 Hours: 40 Credits: 4

Objective: To understand inheritance and related concepts

Learning outcome: Students will learn the structure and function of chromosomes. chromosomal and extra chromosomal inheritance in animals and plant.

UNIT-I: Classical Genetics
Mendelian laws of Inheritance, Test cross & back cross , interaction of genes for monohybrid & dihybrid, Multiple alleles, Linkage& crossing over, its types & significance , lethality, scope & significance of genetics.

UNIT-II: Human Genetics
Sex Linkage, sex limited inheritance, sex linked diseases (any two),Anomalies in sex chromosomes, Anomalies of autosomes: Hereditary defects- Kleinefelter Turner , Cri-du-Chat & Down syndromes.

UNIT-III: Basic Microbial genetics
Conjugation, Transformation Transduction & their use in genetic mapping. Gene Concept Classical & modern gene concepts. Structure of Chromosome, types of chromosomes. Euchromatin & heterochromatin. Polytene & Lampbrush chromosome.

UNIT-IV: Mutation
Mutations-spontaneous & induced; chemical &: Physical mutagens; induced mutation in plants, animals & microbes for economic benefit of man. Gamma garden, parthenocarpy, Structural & numerical aberrations involving chromosomes; evolution in plants (two or three examples) mutation.

Population Genetics
Gene pool, Gene frequency & genotypic frequency. Population genetics Hardly-Weinberg equilibrium, gene & genotypic frequencies. Cytological inheritance. Cytoplasmic Male Sterility.

Text & References:
1. Concepts of genetics -William S. Klug & Michael R, Cummings, Person Education.
2. Genetics, -Strickberger, Prentice Hall College Division.
3. Microbial Genetics- Friefelder- Narosa Publication
4. Principles of Genetics- E.J. Gardner, John W.H. Sons Inc.
5. Genetics, R. Good enough International Thomson Publishing.
6. Genetics- Arora-Himalaya Publication
7. Principles of Genetics, D.P. Suntan & M.J. Simmons, John Wiley & Sons Inc.
8. Molecular Biology of Gene - J.D. Watson, Weiner & Hopkins, Addison-Wesly
9. Genetics, P.K. Gupta, Rastogi Publication.

Practicals:
1. Two examples each on Dihybrid & Monohybrid cross.
2. One example each on interaction of genes.
3. Two examples on Hardy Weinberg law.
4. Study of Karyotype.
5. Study of Human blood group.
6. Observe sex linked characters in tabulation from surroundings human population
7. Study of polytene chromosome.
8. Study of Human Traits

Basics of Biocomputing - CCBI - 3B   Maximum Marks: 75   Hours: 40   Credits: 4

Objective: To understand fundamentals of computer hardware and software

Learning outcome: Students will learn the general Basic architecture of computer, concept of operating system, Hardware

Unit I: Computer system Characteristics and Capability
Basic structure, Block diagram of computer, ALU, Memory, CPU, I/O devices, development of computers, classification of computers (microcomputers, minicomputers, mainframe, supercomputer, PC, server, workstation) Programming language concept (Low level and high level languages)

Unit II: Input/ Output Devices and computer Memory
Keyboard entry, direct entry: Card readers, scanning devices (Barcode, OMR MICR), Voice input devices, pointing devices (light pen, mouse, touch screen, digitizer, scanner), printers: Dot matrix, inkjet, laser, plotter, CRT, LCD, CD-Writer, ZIP drive Types of memory: RAM, ROM, PROM, EPROM, EEPROM etc., Base memory, Extended memory, expanded memory, virtual memory, cache memory, storage devices: tape, FDD, HDD, CD, DVD, Flash drive.

Unit III : Introduction to Operating System DOS/ Windows
Fundamentals of DOS, file and directory, booting procedure of DOS, DOS commands (internal and external), configuration of DOS (config.sys), Batch file concept (autoexec.bat) Features of MS-Windows, GUI, Multitasking etc, Main modules of Windows OS: program manager, control panel, Networks, Elements of Windows: Desktop, applications, icons, Switching between applications: running MS-DOS applications, Windows help, Windows Accessories: Notepad, paintbrush, study of important files of windows (DLL, INI)

Introduction to Linux operating system
Introduction to Linux – Features of Linux; Hardware Requirements Installation, Important Linux Commands.

Unit IV: Introduction to MS Office
MS office: MS Word- Word processing, editing, saving, inserting tables, MS Excel-Spreadsheet, Tables & Charts, Formulas, MS Power Point: Creating presentation, Introduction to MS-Access

Reference Books:-
1. Fundamentals of Computer by V. Rajaraman- PHI
2. Computer Fundamentals- P.K. Sinha- BPB Publication
3. MS DOS- Russel- BPB
4. DOS- Satish Jain- BPB
5. Windows 2000 Complete Reference- BPB
6. Linux complete Reference- Richard Peterson- Tata McGraw Hill
7. Ms Office 2000- Leary- Tata McGraw Hill

Practicals:-
1. Study of various I/O devices
2. Various internal and external DOS commands
3. Study of memory types of computer
4. Practical based on MS-Word, MS- Excel, MS- PowerPoint
5. Study of Linux Operating System