।। सा विद्या या विमुक्तये ।।
स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड
"ज्ञानतीर्थ" परिसर, विष्णुपूरी, 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
Phone: (02462) 229542
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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदव्युत्तर 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 पदव्युत्तर 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. Bioinformatics
2. Biotechnology
3. Boichemistry
4. Botany
5. Chemistry
6. Computer Management
7. Computer Science
8. Dairy Science
9. Environmental Science
10. Herbal Medicine
11. Information Technology
12. M.C.A.
13. Microbiology
14. Physics
15. Software Engineering
16. System Administration & Networking
17. 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–१/परिपत्रक/पदव्युत्तर–सीबीसीएस अभ्यासक्रम/२०१९–२०/**४६४**
दिनांक : ११.०७.२०१९.

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

CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER PATTERN

Post Graduate (PG) Programs under Faculty of Science

(Affiliated Colleges)

(w.e.f. Academic Year 2019-20)

SYLLABUS FOR M.Sc. PART- I EXAMINATION

M.Sc. BIOCHEMISTRY

(SEMESTER PATTERN)

JUNE- 2019

Draft Syllabus Prescribed For
M.Sc. Part- I and Part- II Examination in Biochemistry
(Semester Pattern)

There Shall be total four semester (Two for M.Sc. Part- I and Two for M.Sc .Part- II) . There shall be four theory papers (100 marks each) and four practical papers (100 marks each) Annual pattern.

Eligibility: Any Science graduate

It is expected that the students should visit Research Laboratories and industrial establishments of repute.

M.Sc. Part – I First Semester

Paper No.	Title of the Theory Papers	Period/week	No. Periods	Credit
BCH-01	Enzymology	4	60	4
BCH-02	Microbial Biochemistry	4	60	4
BCH-03	Bioenergetics and Metabolism	4	60	4
BCH-04	Immunology **OR** **Elective paper** Neuro biochemistry	4	60	4
BCH-05 (Seminar)	(25 marks)			Credit : 1
Title of the Practical Papers				
BCH-06	Lab course Enzymology and Microbial Biochemistry	4	60	4
BCH-07	Lab course Bioenergetics and Metabolism and Immunology	4	60	4

M.Sc. Part – I Second Semester

Paper No.	Title of the Theory Papers	Period/week	No. Periods	Credit
BCH-08	Principal of Mol. Biology	4	60	4
BCH-09	Biostatistics	4	60	4
BCH-10	Bioinformatic and Computional Technique	4	60	4
BCH-11	Biophysical Technique **OR** **Elective paper** Molecular basis of infectious diseases	4	60	4
BCH-12 (Seminar)	(25 marks)			Credit : 1
Title of the Practical Papers				
BCH-13	Lab course Mol.Biology and Biophsical	4	60	4
BCH-14	Lab course Bioinformatic and Biostatistic	4	60	4

CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER PATTERN

Post Graduate (PG) Programs under Faculty of Science

(Affiliated Colleges)

(w.e.f. Academic Year 2014-15)

Name of the faculty	Total credits	Average credits per semester
Science	**100**	**25**

Note:

Assessment shall consists of continuous assessment (CA) and End of Semester Examination

(ESE).

Weightage: 75% for ESE and 25% For CA

Tentative Distribution of Credits for PG under Science Faculty:

Semester	Paper No.	External (ESE)	Internal (CA)	Total
Sem I	Paper-I (BCH-01)	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-II (BCH-02)	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-III (BCH-03)	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-IV(BCH-04) **Elective Paper**	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-V (BCH-05) (Seminar)		Credits: 1 (25 marks)	Credits: 1
	Semester I Credits: 17			**Credits: 17**
Sem II	Paper-I (BCH-08)	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-II (BCH-09)	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-III (BCH-10)	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-IV(BCH-11) **Elective Paper**	(75 marks)(25marks)	(2 Test: 15 marks + Assignments:10 marks)	Credits: 4 (100 marks)
	Paper-V (BCH-12) (Seminar)	Credits: 1 (25 marks)		Credits: 1
	Semester II Credits: 17			**Credits: 17**
Lab Course Work(Annual Practical)	LC- I (BCH-06)	(75 marks)	(25 marks)	Credits: 4 (100 marks)
	LC-II (BCH-07)	(75 marks)	(25 marks)	Credits: 4 (100 marks)
	LC-III (BCH-13)	(75 marks)	(25 marks)	Credits: 4 (100 marks)
	LC-IV (BCH-14)	(75 marks)	(25 marks)	Credits: 4 (100 marks)
	Total for Lab Course work (Annual)			**Credits: 16**
	Total For M.Sc. I Year: Sem. I + Sem. II + Lab Course work (Annual) Credit: 50			**Credit: 50**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Paper setting Pattern

M.Sc. Biochemistry Part I (CBCS)

Time: 3 hours **Maximum Marks: 75 (3 Credits)**

Unit	Question No	Section	Marks
I	1.	a	7
	OR	b	8
	1.	x	7
		y	8
II	2.	a	7
	OR	b	8
	2.	x	7
		y	8
III	3.	a	7
	OR	b	8
	3.	x	7
		y	8
IV	4.	a	7
	OR	b	8
	4.	x	7
		y	8
V	5.	a	7
	OR	b	8
	5.	x	7
		y	8

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honors)
M.Sc Biochemistry First Year (Semester-I)
Title of the Paper: Enzymology (BCH-01)

Period: 60 **Marks-75**

Objective(s):
This course aims to give clear understanding of the basic concept of Enzyme technique, extraction and isolation and purification.

Chapter	Contents & Name of the Topic	Hours
1	Historical aspect :Remarkable properties cofactors Nomenclature and classification, isoenzymes, multienzyme. Extraction, purification, criteria's purity.	10 hrs
2	Enzymes kinetics : One substrate reactions, effect of pH, temperature and inhibitions. Two substrate reactions. Mechanism of enzymes action : Acid-base catalysis, proximity and orientation effects, covalent catalysis, strain or distortion and change in environment. Experimental approaches of determination of enzymes mechanism : Kinetics studies, detection of intermediates. X-ray crystallographic studies. Examples of chymotrypsin, triose phosphate isomerases, aldolase etc.	10 hrs
3	Control of enzyme activity : control of activities of single enzyme : inhibitor molecules, availability of substrate or cofactor. Product inhibition. Control by changes in covalent structure of enzymes : a) Reversible Change b) Irreversible change	10 hrs
4	Zymogen activation and phosphorylation dephosphorylation ligand induced changes : Allosteric enzymes. Significance of allosteric and cooperative behavior in enzymes.	10 hrs

5	Multi-enzyme complex : Properties, pyruvate dehydrogenase system. (E. coli and mammalian), multi-enzyme complex from E.coli, fatty acid synthetase.	10 hrs
6	Enzymes as industrial catalysts Methods for enzyme immobilization, supports and their selection Properties of immobilized enzymes, methods and applications, industrial stabilization of enzymes Industrial applications of immobilized enzymes	10 hrs

Course Outcome(s): The student will be able to

1. Understand the basic concept of enzymology.
2. Know the different type of enzyme
3. Understand the different enzyme kinetic.
4. Know the purification of enzyme.
5. Know the mechanism enzyme purification.

Reference Book

1. Fundamental of enzymology by Price and Stevens
2. Enzymology by Dixon and Webb.
3. Enzyme by Palmer.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honors)
M.Sc Biochemistry First Year (Semester-I)
Title of the Paper: Microbial Biochemistry (BCH-02)

Period: 60 **Marks-75**

Objective(s):
To acquire basic knowledge about isolation, cultivation staining of bacteria and metabolism.

Chapter	Contents & Name of the Topic	Hours
1	General character and Classification of microorganism bacteria, fungi, and viruses. Structure of Prokaryotic and eukaryotic cells. Viruses structure, viral replication and cultivation. Staining of bacteria, gram staining and spore staining.	10 hrs
2	Cultivation and growth of bacteria nutritional types of bacteria, bacteriological media, physical condition required for growth, bacterial growth curve and measurement of growth and control of growth, sterilization and disinfection	15 hrs
3	Microbes as component of the environment- nutrient cycle, carbon, nitrogen sulphur and phosphorus cycles. Degradation of industrial waste, petroleum hydrocarbon, pesticide, befouling and corrosion. Bacterial photosynthesis, symbiotic and non symbiotic nitrogen fixation	15 hrs
4	Microbiology of fermented food – dairy products, meat, and fish. Alcoholic beverages-beer, wine. Food spoilage and preseravation process. Microbes as source of food. Application of microbes in industries production of antibiotic, amino acid ,organic acid. Bioconversion process, Microbial insecticides.	10 hrs

5	Antimicrobial agents- Structure of antibiotics antibacterial and antiviral (Function and Mechanism of action	10 hrs

Course Outcome(s): The student will be able to

1. Understand the basic concept of microbial cultivation.
2. Know the different type of staining.
3. Understand the different antimicrobial agent.
4. Know the role of microbe industrial waste.
5. Know the mechanism bacterial photosynthesis.

Reference Book

4. Food Microbiology by W.C Frazier
5. Industrial Microbiology by Presscott.
6. Microbiology by Noel R. Krieg.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honors)
M.Sc Biochemistry First Year (Semester-I)
Title of the Paper: Bioenergetics and Metabolism (BCH-03)

Period: 60 **Marks-75**

Objective(s):
To acquire basic knowledge about metabolism, Synthetic and degrative pathway metabolism.

Chapter	Contents & Name of the Topic	Hours
1	Use of mutants and isotope in the study of metabolism. Compartmentation, food chain and energy flow. Cell bioenergetics: First and second law of thermodynamic, internal energy, enthalpy, entropy, concept of free energy, Standard free change of chemical rection, redox potential ATP and high energy phosphate compounds	10 hrs
2	Glycolysis: Anaerobic pathway of glucose metabolism, two phases of glycolysis. Detailed study of the all reaction. Entry of other carbohydrates in Glycolytic path way, energy balance sheet regulation of glycolytic sequence by enzymes and hormone alcoholic fermentation	10 hrs
3	Citric acid cycle: Aerobic pathway og glucose metabolism, historical background, detail of the cycle .use of isotope for the study of citric acid cycle, interconversion of hexoses, Pasteur effect	10 hrs
4	Lipid Metabolism: Fatty acid metabolism, Beta oxidation of saturated and unsaturated fatty acid, the phase of fatty acid oxidation, energetic of beta oxidation. Oxidation of Fatty acid with odd number of carbon atoms formation of ketone bodies. Integration of carbohydrate and lipid metabolism. Biosynthesis of Lipid : requirement of carbon dioxide and citrate biosynthesis, fatty acid syntheses' complex, Regulation of biosynthesis	15 hrs

5	Electron transport chain and oxidative phosphorylation	5 hrs
6	Glycogen Metabolism: Biosynthesis and degradation of glycygen and its regulation. Starch and cellulose biosynthesis. Gluconeogenesis	05 hrs
7	Nitrogen Metabolism: Oxidative degradation of amino acid. Trans amination, Oxidative deamination, decarboxylation urea cycle Ammonia excretion Purine pyrimidine degradation. Biosynthesis of Purine and Pyrimidine Nucleotides	05

Course Outcome(s): The student will be able to

1. Understand the basic concept of metabolism.
2. Know the different type of metabolism
3. Understand the nitrogen metabolism.
4. Know the energy metabolism of brain.
5. Know the mechanism glycolysis.

Reference Book

7. Biochemistry by Lehninger
8. Metabolic pathway by Greenberg.
9. Biochemistry by Zubay
10. Biochemistry by Stryer.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honors)
M.Sc Biochemistry First Year (Semester-I)
Title of the Paper: Immunology (BCH-04)

Period: 60 **(Section-A)** **Marks-75**

Objective(s):
To acquire basic knowledge about immunology innate and acquired immunity antigen and antibodies.

Chapter	Contents & Name of the Topic	Hours
1	Historical development and milestones in immunology. Definition- antigenicity, immunogenicity, primary and secondary lymphoid organ, self and non self discrimination, innate and acquired immunity.	10 hrs
2	Cellular basis of immunity immunological memory, specificity, diversity, discrimination between self and nonself, primary and secondary lymphoid organ, Cell mediated and humoral immunoresponse. T and B lymphocytes .autoimmunorection	10 hrs
3	Antigen and antibody: antigen , antigenic, determinant, immunopotency, structure of antibody, constant and variable region, Fab, F (ab2) and Fc fragment, different classes of antibodies and their function, fine structure of antibodies X ray diffraction Studies, isotype allotypes and idiotypes.	10 hrs
4	Measurement of antigen- antibody interaction, diffusion, immunodiffusion, immunoelectrophoresis, radioimmunoassay, immunoflorescence. ELISA, Western blotting	10 hrs
5	Clonal selection theory of antibody production, monoclonal and polyclonal antibodies, poly reactive antibodies, Catalytic antibodies, abezymes. Complement system : Classical and alternative pathway	10 hrs

6	T lymphocytes and cell mediated immunity, T cell sub populations, immune response gene, MHC gene complex, polymorphism. Transplantation: Autograft, isograft, allograft and xenograft. Graft rejection vs host rection, Hypersensitivity immunodeficiency diseases vaccine, interferon disorder of immunity blood antigen blood goup substances and Rh factor	10 hrs

Course Outcome(s): The student will be able to

1. Understand the basic concept of immunology.
2. Know the cell mediated immunity
3. Understand the antigen-antibodies interaction.
4. Know the immunodeficiency disease..
5. Know the mechanism ELISA.

Reference Book

11. Immunology by Kuby
12. Essental Immunology by Roit

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honors)
M.Sc Biochemistry First Year (Semester-I)
Title of the Paper: Neuro biochemistry (BCH-04)

Period: 60 **(Section-B)** **Marks-75**

Objective(s):
To familiarize the students with the concept of Synaptic transmission, cellular signalling, synthesis and distribution, metabolism and mechanism of action of drugs.

Unit-I **12**

Synaptic transmission and cellular signalling: An overview Acetylcholine: Chemistry, synthesis, storage and release; Nicotinic and muscarinic receptors; Catecholamine: Biosynthesis, storage and release; Dopamine, adrenergic receptors

Unit-II **12**

Serotonin: Synthesis, action and distribution; Role of serotonin receptors in behavior; Excitatory amino acid transmitters: Synthesis, metabolism, distribution and receptor subtypes; Histamine: Dynamics, molecular sites and action in the CNS; GABA, glycine: Synthesis, uptake and release; Receptors of GABA and glycine.

Unit- III **12**

Neuropeptides neurotransmitters: Biosynthesis, function regulation and receptors; Opioid peptide and opioid receptors: Synthesis, metabolism, distribution and receptor subtypes; CSF; Micro circulation and blood brain and CSF barriers Intracellular signaling; G Proteins and second messengers

Unit-IV **12**

Metabolism: Energy metabolism of the brain; Hypoxic-Ischemic brain injury and oxidative stress; Metabolic encephalopathies; Eicosanoids, docosanoids, platelate-activating factor and inflammation

Unit-V **12**

Mechanism of action of drugs; Drug addiction, drug abuse and adverse drug reaction; Neuroendocrinology of behaviour; Apoptosis and necrosis

Text Books

1. Siegel, Basic Neurochemistry (8th Edition) Academic Press, 2012

2. Friefelder: Practical Biochemistry

3. Kendel, Principles of Neural Science (5th edition), McGraw Hill, 2013

4. Squire, Fundamental Neuroscience (4th Edition), Elsevier, 2013

Course Outcome(s): The student will be able to

1. Understand the basic concept of neurology.
2. Know the different type of receptor
3. Understand the different neurochemical process.
4. Know the energy metabolism of brain.
5. Know the mechanism action of drugs.

M.Sc. Biochemistry
First Year (Semester – I)
Lab course I
(BCH -06)

CREDIT 04

Lab course Enzymology and Microbial Biochemistry

1. Detection of enzyme amylase/ invertase/ urease.
2. To measure amylase activity and specific activity from the given sample.
3. To measure invertase activity and specific activity from the given sample.
4. To measure urease activity and specific activity from the given sample.
5. To determine the effect of temperature on amylase enzyme activity.
6. To determine the effect of time on amylase enzyme activity.
7. To determine the effect of PH on amylase enzyme activity.
8. To determine the effect of substrate concentration on amylase enzyme activity.
9. To determine the effect of enzyme concentration on amylase enzyme activity.
10. To study the effect of Immobilization of enzyme activity
11. To study the effect of Inhibitor on enzyme activity
12. To study the effect of activator (metal ion) on enzyme activity
13. Purification and isolation of enzyme (β amylase from Sweet potao)
14. Sampling, observation and staining of microorganism
15. Replica plate technique

M.Sc. Biochemistry
First Year (Semester – I)
Lab course II
(BCH -07)

CREDIT 04

Lab course Bioenergetics and Metabolism and Immunology

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1. Demonstration of Ag and Ab interaction by Ouchterlony test.
2. Demonstration of Aggulutions reaction.
3. Demonstration of immunoflurosence technique.
4. Purification of Bovine serum immunoglobin G fraction by ammonium sulphate precipitation.
5. Antibody capture assay.
6. Estimation of reducing sugar by DNS method..
7. Estimation of carbohydrate by phenol sulphuric acid method.
8. Blood grouping and Rh typing.
9. Rf factor determination test or RA test.
10. Widal Test
11. PRP Test
12. ASO Test
13. CRP Test
14. HBS
15. Estimation of Protein by folin lowary method.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry

Under Faculty of Science

M.Sc Syllabus Structure

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2019

Subject: Biochemistry (Honors)

M.Sc Biochemistry First Year (Semester-II)

Title of the Paper: Molecular biology (BCH-08)

Period: 60 **Marks-75**

Objective(s):

This course aims to give clear understanding of the basic concept of Molecular Biology, Replication , Transcription ,Translation , Recombination as well as molecular marker

Chapter	Contents & Name of the Topic	Hours
1	DNA Replication: DNA Polymerase I, II, III. Origin of locus, Okazaki fragment, replication fork. DNA repair : Substitution, deletion and insertion mutation pyrimidine dimer, uracil DNA glycosidase	10 hrs
2	Gene rearrangements recombination, Holiday structures, rec A, B, C, D. SOS response. Mobile genetic element.	10 hrs
3	Transcription and recombination: polymerase, promoter, sigma and Rho factor, initiation, elongation, and termination of Transcription. Post transcriptional modification of tRNA and r RNA, Inhibitors of transcription , RNA pol I II III, enhancer 5' capping, 3' poly A tailing, splice site Mechanism of splicing. ribozymes	10 hrs
4	Protein Synthesis, Protein targeting, Intracellular protein targeting. Signal hypothesis, signal sequences, glycosylation, Targetting of protein to mitochondria, lysosomes, ER, Plasma Membrane, perxiosomes, chloroplast. Destruction of protein	10 hrs
5	Potein folding and protein motif. Gene expression	10 hrs
6	Eukaryotic chromosomes and gene expression	10 hrs

Reference Book

13. Biochemistry by Stryer
14. Gene by Benjamin.
15. Cell by Albert.

Course Outcome(s): The student will be able to

1. Understand the basic concept of molecular biology,
2. Know the DNA , RNA, molecular marker etc.
3. Understand the recombination.
4. Know the Protein synthesis.
5. Know the mechanism of eukaryotic gene expression

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honours)
M.Sc Biochemistry First Year (Semester-II)
Title of the Paper: Biostatics (BCH-09)

Period: 60 **Marks-75**

Objective(s):
This course aims to give clear understanding of the basic concept of Biostatics

Chapter	Contents & Name of the Topic	Hours
1	Introduction to biostastics as common term and notation, application. Method of sampling: representative sample, sample size, samplings bias and sampling technique	10 hrs.
2	Data collection and Presentation: Types of data, method of collection of primary and Secondary data. Method of data presentation graphical presentation by histogram, polygon pie diagram	10 hrs.
3	Central Tendency: Measures of central tendency, mean. Mode, and median. Measures of variability, Standard deviation, Standard error, Range mean deviation, coefficient of variation.	10 hrs.
4	Correlation and Regression: Positive or negative correlation, calculation of correlation coefficient and regression coefficient. Regression, linear regression and regression equation. ANOVA one and two way classification	10 hrs.
5	Test of significance: F test, Z test, T test and chi-square test, probability. Distribution- Binomial, Poisson and normal distribution, computer based stastical technique, frequency table of single discreate variable, bubble short computation variance and std. deviation, t-test, correlation coeefficent	10 hrs.
6	Report Writing: introduction,review of literature, material and method results discussion summary and conclusion	10 hrs.

Reference Book

1. Biostatics by nee
2. Biostatics by Mathur.

Course Outcome(s): The student will be able to

1. Understand the basic concept of Biostatics, and application of biostat.
2. Know the different type of data collection,data representation
3. Understand the corelletion,regression and its application
4. Know the report writing.
5. Know the test of signification.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606,MS, INDIA

Distribution of credits for B.Sc Biochemistry

Under Faculty of Science

M.Sc Syllabus Structure

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2019

Subject: Biochemistry (Honors)

M.Sc Biochemistry First Year (Semester-II)

Title of the Paper: Bioinformatics & Computational Technique (BCH-10)

Period: 60 **Marks-75**

Objective(s):

This course aims to give clear understanding of the basic concept of Bioinformatics & Computational Technique.

Chapter	Contents & Name of the Topic	Hours
1	Introduction to hardware and software, binary and decimal number, constant and variables, assignment statement, flow chart and their use if and go statement, Do loops input, output and format statements. Subroutine and function sub programs. Introduction to programming in Basic/fortran/C.	10 hrs.
2	Computer awareness, Basic programming	10 hrs.
3	Writing a few Basic programs related to Biochemistry	10 hrs.
4	Writing a few Basic programs to plot graphs of enzyme kinetics data by variety of linear transform and the Michalies menton hyperbolic plots	10 hrs.
5	Write a basic program to calculate the PH of a dilute salt solute, write a basic program for the analysis of amino acid sequences	10 hrs.
6	Use of packaged statistical computer program for the statistical analysis. Use of computer program to analyze DNA sequences to find complementary sequences, search repeat, restriction sites coding sequences codon usage	10 hrs.

Reference Book

1. Computer and common sense by Hunt
2. Computer programming by Rajaraman.
3. Microcomputer in biochemical education.

Course Outcome(s): The student will be able to

1. Understand the basic about computer.
2. Know the different type hardware,and softwear
3. Understand the different type of computational program used in Biochemistry
4. Know the statical computational programm.
5. Know the basic of computer programming.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED-431606, MS, INDIA

Distribution of credits for B.Sc Biochemistry

Under Faculty of Science

M.Sc Syllabus Structure

CBCS (Choice Based Credit System)

Semester Pattern effective from June 2019

Subject: Biochemistry (Honors)

M.Sc Biochemistry First Year (Semester-II)

Title of the Paper: Biophysical Technique (BCH-11)

Period: 60 **(Section-A)** **Marks-75**

Objective(s):

This course aims to give clear understanding of the basic concept of biophysical Technique, GC, MS, Spectrophotometry, HPLC and HPTLC.

Chapter	Contents & Name of the Topic	Hours
1	UV and visible Spectrophotometers , IR and NMR Spectrophotometers Principal and application	10 hrs
2	Membrane filtration and dialysis: Nitrocellulose, fiber glass, poly carbonate filter Dialysis and concentration reverse dialysis freeze drying, lyophilization.	10 hrs
3	Chromatography: partition and adsorption chromatography- Paper, TLC, GLC, GCMS. Gel filtration – theory material ,advantage mol.wt.determination and other application. Ion exchange chromatography- properties of ion exchanger, choice of technique and application. Amino acid analyzer. HPLC, HPTLC affinity chromatography	10 hrs
4	Electrophoresis: Theory, types moving boundary electrophoresis, Zone electrophoresis, paper, cellulose acetate, gel electrophoresis. Native PAGE, disc PAGE, Gradient PAGE, SDS PAGE. Agarose gel electrophoresis, Southern, northern and western transfer. Isoelctrofocussing	10 hrs
5	Interaction of radiation with matter, passage of neutron through matter. Interaction of gamma rays with matter, units of measuring radiation absorption, radiolysis of water, free radical	10 hrs
6	Autoradiography	10 hrs

Reference Book

1. Physical Biochemistry by freifelder
2. Biophysical Tech by Nath.

Course Outcome(s): The student will be able to

1. Understand the basic technique used in analysis of biomolecules.
2. Know the different type of receptor
3. Understand the different methods of filtration of biomolecule.
4. Know the different methods of chromatography
5. Know the mechanism action autoradiography.

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Distribution of credits for B.Sc Biochemistry
Under Faculty of Science
M.Sc Syllabus Structure
CBCS (Choice Based Credit System)
Semester Pattern effective from June 2019
Subject: Biochemistry (Honors)
M.Sc Biochemistry First Year (Semester-II)
Title of the Paper: Molecular basis of infectious diseases (BCH-11)
Period: 60 (Section-B) Marks-75

Objective(s):
To familiarize the students with the concept of infectious disease, infectious agent and disease caused by bacteria, virus and parasite.

Unit 1 **12**

Classification of infectious agents

Bacteria, Viruses, protozoa and fungi. Past and present emerging and re-emerging infectious diseases and pathogens. Source, reservoir and transmission of pathogens, Antigenic shift and antigenic drift. Host parasite relationship, types of infections associated with parasitic organisms. Overview of viral and bacterial pathogenesis. Infection and evasion.

Unit 2 **12**

Overview of diseases caused by bacteria.

Detailed study of tuberculosis: History, causative agent, molecular basis of host specificity, infection and pathogenicity, Diagnostics, Therapeutics, inhibitors and vaccines. Drug resistance and implications on public health. Other bacterial diseases including Typhoid, Diphtheria, Pertussis, Tetanus, Typhoid and Pneumonia.

Unit 3 **12**

Overview of diseases caused by Viruses

Detailed study of AIDS, history, causative agent, pathogenesis, Diagnostics, Drugs and inhibitors. Other viral diseases including hepatitis, influenza, rabies, chikungunya and polio.

Unit 4 **12**

Overview of diseases caused by Parasites

Detailed study of Malaria, history, causative agents, Vectors, life cycle, Host parasite interactions, Diagnostics, Drugs and Inhibitors, Resistance, Vaccine development. Other diseases including leishmaniasis, amoebiasis.

Unit 5 **12**

Overview of diseases caused by other organisms

Fungal diseases, General characteristics. Medical importance of major groups, pathogenesis, treatment.

SUGGESTED READINGS

1. Prescott, Harley, Klein's Microbiology (2008) 7th Ed., Willey, J.M., Sherwood, L.M., Woolverton, C.J. Mc Graw Hill International Edition (New York) ISBN: 978-007- 126727. 44

2. Mandell, Douglas and Bennett.S, Principles and practices of Infectious diseases, 7th edition, Volume, 2. Churchill Livingstone Elsevier.

3. Sherris Medical Microbiology: An Introduction to Infectious Diseases by Kenneth J. Ryan, C. George Ray, Publisher: McGraw-Hill

4. Medical Microbiology by Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller, Elsevier Health Sciences

Course Outcome(s): The student will be able to

1. Understand the basic concept infectious disease.
2. Know the students diseases due to virus**.**
3. Understand the disease cause by bacteria.
4. Know infectious agent.

M.Sc. Biochemistry
First Year (Semester – II)
Lab course III
(BCH -13)
CREDIT 04
Lab course Mol. Biology and Biophysical

1. Isolation of DNA from E.coil.
2. Isolation of DNA from Yeast.
3. Isolation of plasmid.
4. Isolation of mitochondrial DNA.
5. Estimation of DNA.
6. Isolation of RNA.
7. Estimation of RNA.
8. Separations of DNA fragment by Agarose gel electrophoresis.
9. Demonstration of Beer'law.
10. Determination of pka of amino acid
11. Separation of amino acid by thin layer chromatography
12. Separation and identification of sugar by thin layer chromatogaphy
13. Separation of amino acid by Paper chromatography
14. Polyacrylamide gel electrophoresis to obtain different frgment serum potein
15. Separation of serum protein by ion exchange chromatography

M.Sc. Biochemistry

First Year (Semester – II)

Lab course IV

(BCH -14)

CREDIT 04

Lab course Bioinformatics and Biostatistics

1. Retrieval Sequence from NCBI.
2. Retrieval Sequence from RCSB.
3. Retrieval of protein sequence information from uniport, Swiss port.
4. Sequence analysis of DNA.
5. Estimation of DNA.
6. Similarity search tool.
7. Protein structure prediction.
8. Splice predictor.
9. BLAST.
10. FLAST
11. Measure the central tendency mean, mode and median
12. Standard deviation
13. Standard deviation
14. Standard error
15. One way analysis.