

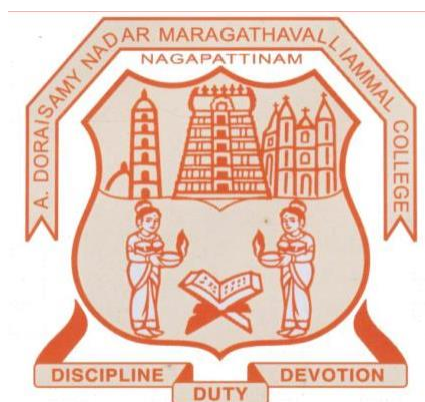
A.D.M COLLEGE FOR WOMEN (AUTONOMOUS),

NAGAPATTINAM- 611001

(Nationally Re-accredited with “A” grade by NAAC-3rd Cycle)

DEPARTMENT OF BIOCHEMISTRY

(for the candidates admitted from the academic year 2019-2020 onwards)



B.Sc, BIOCHEMISTRY

SYLLABUS

A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM

B.Sc., BIOCHEMISTRY

(for the candidates admitted from the Academic year 2019 – 2020 onwards)

PROGRAMME OBJECTIVES

- To build a strong foundation in biomolecules, cellbiology, biotechnology.
- To prepare students for career options in hospital, clinical laboratory, and related fields.
- To equip students with practical skill, interpersonal skill, interpersonal skill, analytical skill.
- To develop Laboratory skills in students.
- To prepare students to enter Masters Programme like M.Sc., and pursue professional programmes dietics, Bioinformatics etc.

B.Sc- 2019-2022

STRUCTURE OF THE PROGRAMME 2019-2022

Part	Title of the Part	No. of Papers	Hours	Credit
I	Language- Tamil	4	24	12
II	English	4	24	12
III	Core Course	15	71	63
	Allied course	4	27	18
	Major Based Elective	3	17	17
IV	Skill Based Elective	3	6	6
	Non-Major Elective	2	4	4
V	Extension Activities	0	0	1
	Value Education	1	2	2
	Environmental Studies	1	2	2
	Soft-Skill Development	1	2	2
	Gender Studies	1	1	1
	Total	39	180	140

Passing Minimum

A candidate shall be declared to have passed in each course if she secures not less than 40% marks out of 75 marks (i.e., 30 marks) in the End Semester Examination (SE) and 40% out of 25 marks (i.e., 10 marks) in the Continuous Internal Assessment (CIA).

A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS), NAGAPATTINAM
DEPARTMENT OF BIO CHEMISTRY
B.Sc., BIO CHEMISTRY
 Course Structure Under CBCS
 (for the candidate admitted from the Academic year 2019 – 2020 onwards)

SEM	PART	COURSE	TITLE	INS. HRS.	CREDIT	EXAM HOURS	MARKS		TOTAL MARKS
							CIA	SE	
I	I	Language Course I (LC)	Tamil I	6	3	3	25	75	100
	II	English Language Course I(ELC)	English I	6	3	3	25	75	100
	III	Core Course I (CC)	Biomolecules	6	6	3	25	75	100
		Core Course II (Practical) (CP)	Major Practical-I	3	-	-	-	-	-
		Allied Course I	Inorganic, organic and Physical chemistry-I	4	4	3	25	75	100
		Allied Practical I (AC)	Inorganic, organic and Physical chemistry-II(Practical)	3	-	-	-	-	-
	V	Value Education	Value Education	2	2	3	25	75	100
	Total				30	18			
II	I	Language Course II (LC)	Tamil II	6	3	3	25	75	100
	II	English Language Course II (ELC)	English II	6	3	3	25	75	100
	III	Core CourseII (Practical)(CP)	Major Practical-I	3	3	3	40	60	100
		Core Course III (CC)	Analytical Techniques	6	6	3	25	75	100
		Allied Course I (AC)	Inorganic ,organic and physical chemistry-II(Practical)	3	3	3	40	60	100
	Allied Course II (AC)	Inorganic, organic and Physical chemistry	4	2	3	25	75	100	
	V	Environmental studies	Environmental Studies	2	2	3	25	75	100
Total				30	22				700

SEM	PART	COURSE	TITLE	INS. HRS.	CREDIT	EXAM HOURS	MARKS		TOTAL MARKS
							CIA	SE	
III	I	Language Course III (LC)	Tamil III	6	3	3	25	75	100
	II	English Language Course III (ELC)	English III	6	3	3	25	75	100
	III	Core Course IV (CC)	Human physiology	6	6	3	25	75	100
			Major Practical II	3	-	-	-	-	-
		Allied Course III (AC)	Biology I	4	4	3	25	75	100
		Allied practical II (AC)	Microbial, plant and cell biology practical	3	-	-	-	-	-
	IV	Non Major Elective I	Women and Health/ Health and disease	2	2	3	25	75	100
		Total	30	18				500	
IV	I	Language Course IV (LC)	Tamil IV	6	3	3	25	75	100
	II	English Language Course IV (ELC)	English IV	6	3	3	25	75	100
	III	Core Course VI (CC)	Cell and Molecular biology	5	5	3	25	75	100
			Major Practical II	3	3	3	40	60	100
		Allied Course IV (AC)	Biology II	3	2	3	25	75	100
	Allied Practical II (AC)	Microbial, plant and cell biology practical	3	3	3	40	60	100	
IV	Non Major Elective II	Cosmetology and hospital management	2	2	3	25	75	100	
		Skill Based Elective I	Herbal medicine	2	2	3	25	75	100
			Total	30	23				800

SEM	PART	COURSE	TITLE	INS. HRS.	CREDIT	EXAM HOURS	MARKS		TOTAL MARKS
							CIA	SE	
V	III	Core Course VII (CC)	Introduction to Enzymology	5	5	3	25	75	100
		Core Course VIII (CC)	Bioenergetics and metabolism	5	5	3	25	75	100
		Core Course IX (CC)	Pharmaceutical biochemistry	6	5	3	25	75	100
		Core Course X (Practical) (CP)	Major practical III	3	3	3	40	60	100
		Major Based Elective I	Medical lab techniques/ Endocrinology	5	5	3	25	75	100
	IV	Skill Based Elective II	Herbal medicine practical	2	2	3	40	60	100
		Skill Based Elective III	Food and Nutrition	2	2	3	25	75	100
	V	Soft skill	Soft Skill Development	2	2	3	25	75	100
			Total	30	29				800
VI	III	Core Course XI (CC)	Clinical Biochemistry	6	6	3	25	75	100
		Core Course XII	Immunology	6	6	3	25	75	100
		Core Course XIII	Major practical IV	5	4	3	40	60	100
		Major Based Elective II	Biotechnology / plant biotechnology	6	6	3	25	75	100
		Major Based Elective III	Bioinformatics/ Genetic Engineering	6	6	3	25	75	100
		Extension Activities	-	-	1	-	-	-	-
V	Gender Studies	Gender Studies	1	1	3	25	75	100	
		Total	30	30				600	
		Grand total	180	140				3900	

DEPARTMENT OF BIOCHEMISTRY

Mark Allocation for Theory Papers

CIA	-	25Marks
External	-	<u>75Marks</u>
		<u>100 Marks</u>

CIA Component

Test	-	10Marks
Assignment	-	2Marks
Seminar	-	3Marks
Quiz/GroupDiscussion	-	5Marks
Attendance	-	<u>5Marks</u>
		<u>25Marks</u>

Pattern of question Paper (Theory)

Section – A	10 x 2 = 20 Marks (No Choice)
Section – B	5 x 5 = 25 Marks (Either / or)
Section – C	3 x 10 = <u>30 Marks</u> (Three out of Five)
Total	<u>75 Marks</u>

NME for B. A/B.Com / BBA – III& IV Semester – Women and Health/ Health and diseases and Cosmetology/ Hospital management.

Mark Allocation for Practical Papers

CIA	-	40Marks
External	-	<u>60Marks</u>
		<u>100 Marks</u>

Practical CIA component

Modelpractical	-	20marks
Practical Skill	-	10 marks
Record	-	5 marks
Attendance	-	<u>5 marks</u>
Total		<u>40 marks</u>

Pattern of question Paper for Practical

Section–A Major = 35Marks (two out of three)

Section –B Spotters 3 x 5 = 15 Marks (Either / or)

Record Work 10 marks

Total 60marks

PROGRAMME OUTCOME:

- Students acquired necessary knowledge and skills to undertake a career in research either industry.
- Integrate and apply the techniques Analytical Biochemistry, Clinical Biochemistry, Molecular Biology and Basics in Bioinformatics.
- Handling microbial, cellular and biochemical systems.
- Facilitate placement in various clinical laboratories and biological research.
- Contribution to the betterment of the society by inculcating expertise in health sector.

PROGRAMMES SPECIFIC OUTCOMES :

- An ability to acquire in-depth theoretical and practical knowledge of Biochemistry and the ability to apply the acquired knowledge to provide cost efficient solutions in Biochemistry.
- An ability to properly understand the technical aspects of existing technologies that help in addressing the biological and medical challenges faced by humankind.
- After completion of Biochemistry program students will able to get exposed to strong theoretical and practical background in fundamental concepts.
- To get insights of multiple important technical areas of Biochemistry.
- To apply contextual knowledge and modern tools of biochemical research for solving problems.
- To make them able to express ideas persuasively in written and oral form to develop their leadership qualities.
- To demonstrate professional and ethical attitude with enormous responsibility to serve the society.

CORE COURSE - I

BIOMOLECULES

Internal :25
External :75
Exam Hours : 3

Semester 1
No. of Hours/ Week : 6
Credit:6

Course Objectives:

- To enable the students can get knowledge about structure, classification of carbohydrate, amino acids, lipids & vitamins.
- Learn the elements present in biomolecules and difference monomers
- Identify their chemical elements of nucleotide
- Learn about saturated and unsaturated fatty acids.
- Learn about types and nutritional requirements of Macrominerals and Microminerals.

UNIT I CARBOHYDRATES:

Carbohydrates: Occurrence, Chemical properties, Classification and elucidation. Configuration of Glucose, Fructose. Inter Conversion of sugars, Structure and biological functions of Mono (Triose to xedose), Di, Oligo (Tri, tetra, penta) and polysaccharides.

Homo and Heteroglycans. Reaction based on functional groups: Aldehyde & Ketone.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II AMINOACIDS & PROTEINS :

Amino acids - Structure. Classification essential and non essential amino acids & physical, chemical, biological properties Zwitter ions isoelectric point. Proteins- Classification, Primary, Secondary, tertiary and Quaternary structure (Haemoglobin and Myoglobin only). Protein in biological properties Denaturation & Renaturation with agents.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III FATTY ACIDS & LIPIDS:

Fatty acids: Definition, classification (saturated & unsaturated & PUFA). Essential and non essential fatty acids- general properties.

Lipids: Definition, classification, structure, properties- physical, chemical, biological properties of lipids. Example (cholesterol & lecithin structure).

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV NUCLEIC ACIDS:

Purine and pyrimidine bases, nucleosides, nucleotides. Classification, Structure and Functions of nucleic acids. Types of DNA and RNA (Watson & Crick model of DNA), RNA (tRNA, rRNA, mRNA).

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V VITAMINS & MINERALS

Vitamins – Definition, occurrence, Classification, Structure, Nutritional Requirements & deficiency Diseases of fat soluble(A,D,E,K) and water soluble(Vitamin C & Folic acids, cyanocobalamine).

Minerals and its biological importance, sources, types and nutritional requirements of Macrominerals and Microminerals (sodium, potassium, calcium, phosphorous, magnesium, zinc, iron, cobalt)

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Text Books:

1. Fundamentals of Biochemistry for Medical students – Ambika Shanmugam
2. U.Satyanarayana, “Biochemistry”, 4 th edition, 2014.

Reference Books:

1. David L nelson Michael M. cox, “Principals of Biochemistry “,Leninger, Nelson cox worth Publishers, 7th edition2013.
2. Neale Ridgway, Roger Mcload, “Biochemistry of lipids ,lipoproteins membrane”, Amsterdam Elsevier, 6th edition,2015
3. J.L. Jain, “Fundamentals of Biochemistry”, 7th edition,2015.
- 4.Robert K, “Introductory Experiments on Biomolecules and theirInteractions”,2015.
- 5.Wolters Kluwer,” Lippincott illustrated reviews biochemistry”, 7th edition,2017.

Web Resources:

1. <https://topfreebook.com>
2. <https://bookboon.com>.
3. <https://www.e-booksdirectory.com>

Course Outcomes:

On completion of the, students should be able to do

- This paper trains students to appreciate the salient features of biomolecules the organization of life.
- It spans over the significance and methodology involved in characterizing major biomolecules.
- It helps the students in understanding the classification functions and application aspects of biomolecules.
- Haveknowledgeofthestructure/conformationalfreedomofbimolecular,e.gproteins,DNA/RNA, carbohydrates and key metabolites/co-factors, e.g. be able to draw and recognize key structures such as the 20 amino acids 5 and major metabolites.
- Understand and demonstrate haw the structure of biomolecules determines their chemical properties and reactivity.

CORE PRACTICAL –I

MAJOR PRACTICAL-I

Internal :40
External :60
Exam Hours : 3

Semester:I&II
No. of Hours/ Week:3
Credit:3

Course Objectives:

- To understand principle, theory and calculations of experiment.
- To gain hands on preparation of all the solutions and to standardize solutions individually.
- To enable the students can get practical knowledge about the qualitative analysis of biomolecules

I. QUALITATIVE ANALYSIS:

a. Carbohydrates

Glucose

Fructose

Lactose

Sucrose

Starch

b. Aminoacids

Tryptophan

Proline

Histidine

Arginine

C. Lipids

Libermann-Burchard's test

Aromatic Aliphatic test.

II. QUANTITATIVE ANALYSIS

- a. Estimation of reducing sugar Benedict's quantitative method
- b. Estimation of Amino acids by Formal titration.
- c. Estimation of Protein by Calorimetric Method.
- d. Estimation of Ascorbic acid by titrimetric method using 2, 6 dichlorophenyl indophenoldye.
- e. Acid number,
- f. Iodine number
- g. saponification number of lipids.
- h. Estimation of Calcium by titrimetric method.

Text Books:

1. Dr. J. Jayaraman, "Manuals in biochemistry" New Age International Publishers, Bangalore, 2011.

Reference Books:

1. Plummer, "Practical biochemistry", New Delhi: Tata McGraw Hill Publishing Company, 2013.
2. S. Sadasivam, V.A. Manickam, "Biochemical Methods", New Age International Publishers, 2nd edition, 2015.
3. Anil Kumar, Sarika Garg and Neha Garg. Vinod Vasishtha, "Biochemical tests – Principles and Protocols" Viva Books Private Ltd, 2016.

Web Resources:

1. <https://www.topfreebooks.org>.
2. <https://bookboon.com>.
3. <https://www.e-booksdirectory.com>

Course Outcomes:

On completion of the, students should be able to do

- This paper introduces people to chemical reasoning and thinking, encouraging application of chemical rules and logic to problems.
- Draw molecules and reaction mechanisms, understand experiments aimed at elucidating mechanism.
- Students understand various identification tests for carbohydrates and amino acids.
- Students acquire the skill to distinguish reducing and non-reducing sugars.

CORE COURSE - II

ANALYTICAL TECHNIQUES

Internal :25
External :75
Exam Hours : 3

Semester:I
No. of Hours/ Week :6
Credit:6

Course objectives:

- To enable the Students to have a deep knowledge on the techniques for measurement of biophysical factors in living organism.
- To enable the Students to get on insight on the usage of various techniques and their applications in industry.
- To enable the students understand the principle, instrumentation and application of various biochemical techniques.

UNIT I Chromatography

Definition, Principles, Instrumentation & applications of paper chromatography, Thin layer chromatography, Column chromatography, Gas liquid chromatography, ion exchange chromatography,

High performance liquid chromatography ,molecular sieve chromatography and affinity chromatography.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II ELECTROPHORESIS

Definition, Principles, Instrumentation & Applications of paper electrophoresis, agarose gel electrophoresis, PAGE, SDS – PAGE, Immuno electrophoresis, Isoelectro focusing. Factors affecting electrophoretic techniques.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III CENTRIFUGATION

Homogenization and cellular fractionation.

Centrifugation: Definition Principles RCF, sedimentation velocity and gravitational force and its units. instrumentation and application of analytical – preparatory and ultra Centrifugation. Molecular weight determination of proteins.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV SPECTROSCOPY

Beer's – Lambert's Law, Calorimetry, Definition Principles, Instrumentation and application of spectrophotometer – flame photometer, emission, NMR, ESR, instrumentation of atomic absorption spectroscopy and fluorescence spectroscopy

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V RADIO ISOTOPES

Definition Radioactive decay: Measurement of radioactivity – GM counter, Scintillation counter and autoradiography. Trace and techniques Biological applications of isotopes.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Text Book:

1. Chatwal / Anand, "Instrumental method of chemical analysis", 2005

Reference Books:

1. Keith Wilson & John Walker, "Principles and techniques of practical biochemistry", Cambridge University Press, India 2005.
2. Shourie and Shilpa S Chapadagaonkar, "Bioanalytical techniques", Abhilasha the energy and resources institute, TERI, India 2015.
3. Ghosal Sabari and Srivastava, "Fundamentals of bio analytical techniques and instrumentation", A.K. PHI Learning Pvt. Ltd.
4. Pavia et al, "Introduction to Spectroscopy" Brooks/Cole Publishers Co., New Delhi, India 3rd edition., 2000.
5. K.K. Machve, "Basic Instrumentation", Neha Publishers & Distributors, India 2010.

Web Resources:

1. <https://www.topfreebooks.org>.
2. <https://bookboon.com>.
3. <https://www.e-booksdirectory.com>

Course Outcomes:

- Students acquired the various analytical techniques.
- On completion of this paper, the learner will be able to perform Beer's law calculations and calorimetry.
- Describe the principles of thin layer chromatography (TLC) and high performance liquid chromatography (HPLC) Draw a schematic diagram of the instrumentation.
- Employ the knowledge for the separation of proteins/ polypeptides by selecting appropriate separation techniques, characterize certain functionalities of biomolecules by using spectroscopic techniques.
- Significantly enhanced Knowledge of methodology in various laboratory techniques.

CORE COURSE IV

HUMAN PHYSIOLOGY

Internal : 25
External : 75
Exam Hours : 3

Semester : III
No. of Hours/ Week : 6
Credit : 6

Course Objectives:

- To enable the students can get knowledge about various physiological system and their function in human anatomy.
- To learn the function of body fluid.
- To study the concepts of digestive system.
- To learn the structure if circulatory system.
- To acquire knowledge about excretory, Nervous system and reproductive system.

UNIT I BODY FLUIDS

Extra cellular fluid - plasma - Interstitial and transcellular fluid. Intracellular fluid: Lymph and Blood - composition, functions, osmolarity of the body fluids, ionic composition, electrolytes, body buffers. Blood cells, hemoglobin, haemopoiesis, blood coagulation & blood groups.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II DIGESTIVE SYSTEM

Introduction to physiology. Anatomy of digestive system salivary, Gastric and bilarsecretions - composition and functions. Intestinal hormones, movements in Gastro intestinal tract, Secretion, digestion and absorption in the small intestine. Large intestine; Digestion and absorption of carbohydrates, lipids and proteins.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III CIRCULATION

Structure of Heart and blood vessels, cardiac cycles, blood pressure, factors affecting Blood pressure electrocardiogram. Respiration: Anatomy and physiology of respiration exchange of gases between lungs and blood, blood and tissues. Role of lungs in acid - base balance.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV EXCRETORY AND NERVOUS SYSTEM

Structure of Kidney, nephron composition and formation of urine, Renal regulation of acid - base balance. Muscles : types of muscles structure, mechanism of muscle contraction. Nervous system : structure of brain, neuron, nerve impulse, synapse, cerebrospinal fluid and blood brain barrier.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V REPRODUCTIVE SYSTEM

General anatomy of the male and female reproductive organs. testis, ovary, uterus, menstrual cycle, physiological changes. Spermatogenesis, ovulation, physiology of pregnancy- metabolic changes during pregnancy.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Text Book:

Human Physiology ,Arumugam,2007.

Reference Books:

1. Human physiology ,Vol. I & II - C.V. Chatterjee, 2000
2. Function of Human body , Guyton A.C. , 1996
3. The living body ,Best C.H. Taylor N.B. ,2000
4. Human Physiology ,Systemic &applied ,Sahalya,2007
5. Hand Book of Basic Human Physiology,Dr.H.Singh,2008
6. Animal Physiology,Mohan .P.Arora,2008

Web Resources:

1. <https://library.palmer.edu/physioweb>.
2. <https://www.getbodysmart.com/a-p-resources>.
3. <https://openstax.org/details/books/anatomy-and-physiology>.

Course outcomes:

On completion of the students should be able to do

- Ensure the students to acquire knowledge on composition and function of body fluid.
- To understand the apply the various concepts of digestive system.
- To understand the anatomy and physiology and cardiovascular and respiratory system.
- To classify different type of muscle and anatomy of excretory and nervous system.
- To understand the general anatomy and function of the male and female reproductive organs.

CORE COURSE V

MAJOR PRACTICAL II

Internal : 40
External : 60
Exam Hours : 3

Semester : III
No. of Hours/ Week : 3
Credit : 3

Course objectives:

- To understand preparation of buffer.
- To estimate the DNA and RNA.
- To learn about the separation procedure.
- Isolation of DNA methods.
- Demonstrate of electrophoresis

1. Preparation of phosphate, citrate buffers, and measurement of pH
2. Estimation of DNA by Diphenylamine methods
3. Estimation of RNA by Orcinol method
4. Separation of amino acid by paper chromatography
5. Separation of sugar by paper chromatography
6. Separation of amino acid by thin layer chromatography
7. Mitosis (onion root tip)
8. Isolation of DNA from Animal tissue
9. Demonstration of Agarose gel electrophoresis
10. Titration curve of an amino acid

Reference Books:

1. Manuals in Biochemistry, Dr. J. Jayaraman, 1996
2. Manuals in Biochemistry, Dr. S. Ramakrishnan, 1996
3. Practical Biochemistry, Plummer, 2007
4. Introductory practical biochemistry, S.K. Sawhney, 2001
5. Practical biochemistry, Varley, 2008

Web Resources:

1. <https://www.pinterest.com/pin/160088961737334652/>.
2. <https://iubmb.onlinelibrary.wiley.com/doi/pdf/10.1016/0307-4412%2875%2990076-X>.

Course Outcomes:

On completion of the students should be able to do

- The student gets knowledge about the principles in various analytical techniques.
- To understand the different types of buffer preparation and measurement of pH.
- To estimate the RNA and DNA used in specific methods.
- To learn the different types chromatography in separation of amino acid and sugar.
- To understand the isolating the DNA from animal tissue.

ALLIED COURSE III

BIOLOGY I

Internal : 25
External : 75
Exam Hours : 3

Semester : III
No. of Hours/ Week : 4
Credit : 4

Course Objective:

- To understand the molecular biology.
- To learn the structure of membrane.
- To study about the structure and function of cellular organelles.
- To understand the developmental biology in animals.
- To acquire knowledge about developmental biology in plants.

UNIT I

Molecular Biology - Structure of atoms, molecules and chemical bonds. Composition, structure and functions of biomolecules: carbohydrates, proteins, lipids and nucleic acids. Stabilizing interactions: Vanderwaals, electrostatic, hydrogen bonding and hydrophobic interactions.

UNIT II

Cell Biology – Membrane: structure of membrane, lipid bilayer, osmosis, ion channels, and membrane pumps, active transport, electrical properties of membranes.

UNIT III

Cell Biology – Structure and function of cellular organelles – cell wall, nucleus, mitochondria, golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast, chromosomes, chromatin, mitosis and meiosis and cell cycle.

UNIT IV

Developmental Biology – Animal: Production of gametes, zygote formation, blastula, gastrula and formation of germ layers in animals, embryogenesis. Programmed cell death, ageing and senescence.

UNIT V

Developmental Biology – Plants: Double fertilization in plants, seed formation, germination, organization of shoot and root apical meristem, shoot and root development, flowering.

Reference Books:

1. General, organic and Biochemistry, 2nd edition, Ira blei & George Odian, W.H. Freeman Company, New York 2006.
2. Molecular Biology of the cell- 4rd ed. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter. New York: Garland Science; 2002.
3. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, P.S.Verma & V.K. Agarwal, S. Chand & Company Ltd, New Delhi, 2004
4. Environmental Biology (Principles of Ecology) P.S. Verma & V.K. Agarwal, S. Chand & Company Ltd, New Delhi, 2012.
5. Cell Biology, C.B. Powar, Himalaya Publshing House, 2010.
6. Plant Biochemistry, 4th ed, Hans-walter Heldt, Academic press, Elsevier Publications, 2010.

7. Plant Physiology 4th ed, SN Pandey, BK Sinha, Vikas Publishing House, New Delhi, 2009.
8. Introductory Modern Biology, S.Sundara Rajan, Anmol Publications Pvt. Ltd, New Delhi.
9. Text Book of Plant Physiology, V. Verma, Ane Books Pvt. Ltd, New Delhi, 2011.
10. Essentials of Modern Bology, R.C. Sobti, V.L. Sharma, Ane Books India, 2009.

Web Resources:

1. <http://www.freebookcentre.net/Biology/Biology-Books-Online.html>.
2. <https://brill.com/view/serial/BIOEB>.

Course Outcomes:

On completion of the students should be able to do

- To learn the energy and information flow living system.
- Gain the knowledge in the membrane and properties of membrane.
- Form and function of cells organelles.
- To understand then animal biology.
- To understand the development of plant biology.

ALLIED PRACTICAL II

MICROBIAL, PLANT AND CELL BIOLOGY PRACTICAL

Internal : 40
External : 60
Exam Hours : 3

Semester : III
No. of Hours/ Week : 3
Credit : 3

Course Objectives:

- To enable the student understand the microscopic techniques.
 - To determine gram staining identifying bacteria.
 - To separate the chloroplast pigment by chromatography.
-
1. To learn use of microscope, principle of fixation and staining.
 2. Study of various plant cell types.
 3. To carryout gram staining for identifying bacteria.
 4. To prepare squash mounts of onion root tips to study mitosis.
 5. To study meiosis through permanent slides.
 6. Separation of chloroplast pigments by paper chromatography.
 7. To study the cytochemical distribution of nucleic acids and mucopolysaccharides within cells/tissues from permanent slides.
 8. To raise the culture of E.coli and estimate the culture density by turbidity method. Draw a growth curve from the data.
 9. Observation of various stages of chick embryo.
 10. Measurement of Physico – Chemical parameters in aquatic environment.
 - A. Dissolved Oxygen
 - B. Salinity
 - C. pH (Using pH paper (or) pH meter or Lovibond Comparator). Free Carbon –di-oxide, carbonates and bicarbonates.

Reference Books:

1. Biology, 8th edition, Campbell, N.A. and Reece, J. B. Pearson Benjamin Cummings, San Francisco (2008).
2. Biology 7th edition, Raven, P.H et al Tata McGraw Hill Publications, New Delhi (2006).
3. Introduction to Genetic Analysis, 9th edition, Griffiths, A.J.F, W.H. Freeman & Co. NY (2008).
4. Introductory Microbiology (Bell and Howell Co, London), Ross, F.C. (1986).
5. Practical Cytology, Taylor, R.G.W, Academic Press, London (2005).

Web Resources:

1. https://www.researchgate.net/publication/334107842_Practical_lab_manual_for_microbiology_and_plant_pathology.
2. <http://www.scientificpub.com/upload/pdf/465.pdf>.

Course Outcomes:

- To determine the various type of techniques microscopic and gram staining.
- To estimate the various plant cell type and onion root mitosis.
- To improve the culture medium identification.

NON MAJOR ELECTIVE I WOMEN AND HEALTH

Internal : 25
External : 75
Exam Hours : 3

Semester : III
No. of Hours/ Week : 2
Credit : 2

Course Objective:

- To learn the female reproductive system and diseases.
- To understand the vaccines for during pregnancy.
- To study of different types of parturition.
- To learn the health problem in women.
- To enable the students can get knowledge about balanced diet for women.

UNIT I

Study of the female reproductive system, female hormones, menarche, menstrual cycle, menopause associated problem, s-premenstrual syndrome, amenorrhoea, dysmenorrhoea, polycystic ovarian diseases (PCOD) and fallopian tube obstruction, nutrition during adolescence.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Pregnancy, vaccines and diagnosis test during pregnancy, foetal testing –amniocentesis and other tests for genetic abnormalities ,genetic counselling complications associated with pregnancy –gestational diabetes, ectopic pregnancy ,miscarriage ,nutrition during pregnancy.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Parturition –different types, significance of breast feeding, nutrition during lactation, vaccination for infants, contraceptive methods, sexually transmitted diseases.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Health problems in women, cancer –breast cancer ,cervical cancer ovarian cancer, diagnosis and treatment. menopause associated problems-osteoporosis. Hormones replacement therapy.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Balanced diet for women –carbohydrate ,lipids, proteins vitamins and minernals-sources and deficiency disorders .physicals activity –calorie expenditure for various activities, aerobics and yoga.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference books:

1. Essential of food and nutrition, Vol.I and II, Swaminathan.M, 2006
2. Food chemistry, L.G.Meyor
3. Food Science, Polter
4. Nutrition Science, B.Sri Lakshmi, 2008
5. A text book of Health Worker (ANM), Vol I and II, A.M .Chacklay.

Web Resources:

1. <https://www.elsevier.com/books/women-and-health/goldman/978-0-12-288145-9>.
2. <https://www.ebooks.com/en-us/subjects/health-fitness-women-s-health-ebooks/401/>.

Course Outcomes:

On completion of the students should be able to do

- Ensure the students to acquire knowledge on anatomy of female reproductive system and related diseases.
- To understand the concepts of vaccines and genetic complication during the pregnancy.
- To understand acquire knowledge on different types of parturition and vaccination for infants.
- Ensure the students to understand acquire knowledge on diagnosis and treatment in health problem for women
- Ensure the students to understand acquire knowledge on balanced diet and physical activity for women

CORE COURSE VI

CELL AND MOLECULAR BIOLOGY

Internal : 25
External : 75
Exam Hours : 3

Semester : IV
No. of Hours/ Week : 5
Credit: 5

Course objective:

- To bring understanding of structure and function of cells.
- To study about cell organelles.
- To know about replication of DNA
- To learn about Eukaryotic and prokaryotic transcription.
- To learn the mechanism of translation.

UNIT I STRUCTURE OF THE CELL

Cell wall - structure, components and functions. Cell surface, function, surface receptor, surface carbohydrate and surface recognition and lectins. signal transduction system-types of transport across membrane receptor GPCR, Second messenger –CAMP,IP3,Ca+.cell division and cell cycle.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II CELL ORGANELLES

Structure and functions of plant and animal cell organelles-Endoplasmic reticulum, Golgi apparatus Lysosomes, Mitochondria, Ribosomes, Chloroplast, centrosomes, Vacuoles, Nucleus and nucleoli. Chromatin structure and function.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III REPLICATION

Evidences of DNA as genetic material. Types of replication-Mechanism of replication-Enzymes and accessory proteins involved in replication, DNA repair mechanism.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV TRANSCRIPTION

Prokaryotic and Eukaryotic transcription- Mechanism of initiation, elongation and termination of transcription. Post transcriptional modification. Inhibitors of transcription-Jacob and Monod concept-Regulation of transcription.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V TRANSLATION

Prokaryotic and eukaryotic translation mechanism of translation, post translational modification. Genetic code and its characteristic features.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference books:

1. Cell biology , Rastogi , 1979
2. Cell biology , C.B. Power ,2002
3. Molecular Biology , Freifelder ,2000
4. Essentials of Molecular biology, Freifelder, 2006
5. Molecular Biology-A.V.S.S.SAMBAMUTY, 2008
6. Cell Biology,Dr.V.K.chhazllani-2008
7. Cell and Molecular biology ,Prakash .s.Lohar,2009
8. Freifelder's Essentials of Molecular biology ,George,2008.

Web Resources:

1. <https://www.pdfdrive.com/cell-biology-books.html>.
2. https://books.google.co.in/books/about/Cell_And_Molecular_Biology.html?id=iXeQ1Bi9P7cC.

Course Outcomes:

On completion of the students should be able to do

- To understand the cell and types of signal transduction system.
- Ensure the students to understand structure and function of plant and animal cell organelles.
- To study the basic types of replication and replication mechanism.
- To understand the different stage of mechanism if transcription.
- Ensure the students to understand acquire knowledge on prokaryotic and eukaryotic translation.

ALLIED COURSE IV

BIOLOGY II

Internal : 25
External : 75
Exam Hours : 3

Semester : IV
No. of Hours/ Week : 3
Credit : 2

Course Objective:

- To understand the taxonomy.
- To learn about the inheritance biology.
- To introduce the importance of plant physiology.
- To acquire knowledge about environmental biology.
- To learn about the evolutionary biology.

UNIT I

Taxonomy – Concepts of species of hierarchical taxa, biological nomenclature, classical and quantitative methods of taxonomy, classification of plants, animals and microorganisms.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Inheritance Biology – Mendelian principle, allele, multiple allele, pseudo allele, co dominance, incomplete dominance, pleiotropy, linkage and crossing over, sex linkage, sex limited and sex influenced characters. Inheritance of Mitochondrial and chloroplast genes, maternal inheritance.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Plant Physiology – Photosynthesis, C₃, C₄ pathway, photorespiration, nitrate and ammonia assimilation, plant hormones, Phytochemicals; alkaloids, flavonoids, saponins, quinones, terpenes, phenols, nitrogenous compounds - functions.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Environmental Biology – Physical environment, biotic and abiotic, Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement energy flow and mineral cycling in ecosystem. Terrestrial and aquatic ecosystem.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Evolutionary Biology – Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Spontaneity of mutations; the evolutionary synthesis. The evolutionary time scale; Eras, periods and epoch; Origins of unicellular and multi cellular organisms; Hardy – Weinberg law.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference Books:

1. General, organic and Biochemistry, 2nd edition, Ira blei & George Odian, W.H.Freeman Company, NewYork 2006.
2. Molecular Biology of the cell- 4rd ed. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter.New York: Garland Science; 2002.
3. Cell Biology, C.B. Powar, Himalaya Publshing House, 2010.
4. Plant Biochemistry, 4th ed, Hans-walter Heldt, Academic press, Elsevier Publications, 2010.
5. Plant Physiology 4th ed, SN Pandey, BK Sinha, Vikas Publishing House, New Delhi, 2009.
6. Environmental Biology (Principles of Ecology) P.S. Verma & V.K. Agarwal, S. Chand & Company Ltd, New Delhi, 2012.
7. Introductory Modern Biology, S. Sundara Rajan, Anmol Publications Pvt Ltd, New Delhi.
8. Text Book of Plant Physiology, V. Verma, Ane Books Pvt Ltd, New Delhi, 2011.
9. Essentials of Modern Bology, R.C. Sobti, V.L. Sharma, Ane Books India, 2009.
10. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, P.S. Verma &V.K. Agarwal, S. Chand & Company Ltd, New Delhi, 2004.

Web Resources:

1. <https://open.umn.edu/opentextbooks/textbooks/167>.
2. <https://courses.lumenlearning.com/suny-osbiology2e/>.

Course Outcomes:

On completion of the students should be able to do

- To ensure the students basic concepts and methods of taxonomy.
- To understand the principle of mitosis and inheritance of mitochondrial genes.
- To study about the pathway of plant physiology and photochemical of plants.
- To ensure the students understand the physical environmental of biology.
- To study about the basic concepts of evolutionary biology.

**NON MAJOR ELECTIVE II
COSMETOLOGY**

Internal : 25
External : 75
Exam Hours : 3

Semester : IV
No. of Hours/ Week : 2
Credit : 2

Course Objectives:

- To learn the scope of beauty culture and health care.
- To understand the able to perform skills.
- To introduce the hair analysis.
- To acquire knowledge about cosmetic allergy.
- To learn about the health care.

UNIT I

Scope of beauty culture and health care. Career opportunity in beauty culture, Hotels and cosmetics industry.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Manicure, pedicure and basic facials, electrology. Professional ethics and Communication skills. Home care recipes for skin and hair.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Factors influencing hair loss, hair analysis and treatments, hair cuts, coloring and dyeing, hair rebonding, transplantation, body and facial hair removals.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Definition of Cosmetology, Cosmetics allergy, skin analysis and care of various types of skin, body and nail art.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Definition of physical and mental health. Social health and beauty with respect to care. Balanced diet for better beauty and health care. Sources and role of natural Antioxidant.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference Books:

1. Mythil's beauty care.
2. Harry's cosmetology
3. Anatomy, physiology and health education by Dr.Murugesh (Sathya publisher)
4. Meesa's beauty care series
5. Beauty Culture-H.Ellen Browing (Kessinger Publications)
6. Beauty Culture-A Practical Handbook on the Care of the Person-William.A.Woodbury.

Web Resources:

1. <https://www.pdfdrive.com/cosmetology-books.html>.
2. <https://www.pdfdrive.com/cosmetology-e57742835.html>.

Course Outcomes:

On completion of the students should be able to do

- To ensure the students basic concepts of beauty culture and health care.
- To understand the skill in the areas of skin, make up, manicuring.
- To study about the hair analysis such as hair cutting, coloring, styling.
- To understand the cosmetic allergy for skin ,hair and nail
- To ensure the student understand the physical, mental and health care.

SKILL BASED ELECTIVE I

HERBAL MEDICINE

Internal : 25
External : 75
Exam Hours : 3

Semester : IV
No. of Hours/ Week : 2
Credit : 2

Course Objectives:

- To learn the history of herbal medicine.
- To understand the source of herbal materials.
- To learn the drug yielding.
- To understand the physical and chemical constants.
- To learn the plant morphology.

UNIT I

Definition, Brief history, scope and application of herbal medicine. Study of various systems of drugs of plant origin in Allopathy, Ayurveda, Unani, Siddha, Homeopathy and Aromapathy.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Source of herbal raw materials, identification, collection and processing of herbal drugs and authentication.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Study of selected drug yielding microbial and groups (With reference to drug only). Actinomycetes, Fungi- Actinomycetes, gymnosperms, algae, Lichens and Bryophytes.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Determination of physical and chemical constants such as extractive values, moisture content, volatile oil content, ash values and bitterness value.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Plant morphology –Botanical description of various plants parts used as drugs such as root, Rhizome, stolon, bulb, bark, leaf, flower, fruits, and seed. biological importance of phytochemicals.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

References Books:

1. Herbal medicines by Dr.M.D .Zulfeequar Alam-2008
2. Ayurvedic materials media for domestic use by Thohomas J.Graham-2006
3. India medical plants by orient Longman-1996
4. Medicinal Plants ,A.K.shrivastava,2010
5. Herbal drug technology,S.S Agarwal & M.Paridhavi
6. Modern Methods of plant Analysis,Peach &Tracey
7. Pharmacognosy,C.K Kokate, A.P.Purohit and S.B.Gokhale-2007
8. Plants that heal,Dr.J C.Kurian

Web Resources:

1. <https://www.kobo.com/us/en/ebook/fundamentals-of-herbal-medicine-3>.
2. https://www.barnesandnoble.com/b/free-ebooks/nook-books/alternative-medicine-natural-healing/herbal-medicine/_/N-ry0Z8qaZ11iu.

Course Outcomes:

On completion of the students should be able to do,

- To ensure the students scope and application of herbal medicine.
- To understand the raw materials of herbal medicine.
- To study about the drug yielding in fungi and algae.
- To understand the determination of physical and chemical constants.
- To study about the botanical description of various plants.

**CORE COURSE VII
INTRODUCTION TO ENZYMOLOGY**

**Internal : 25
External : 75
Exam Hours : 3**

**Semester : V
No. of Hours/ Week : 6
Credit : 5**

Course Objectives:

- To enable the students can get knowledge about the classification of enzymes
- To study the Isolation and purification of enzymes
- To understand the enzymes in lock and key hypothesis
- To know about the concept of enzymes involved in pharmaceutical of medicine
- To learn about the application of enzyme in food.

UNIT I CLASSIFICATION, PROPERTIES OF ENZYME

Definition, Nomenclature and classification of enzymes, properties and enzymes as biological catalyst. Specificity of enzymes, assay of enzymes. Structure and functions of coenzymes. Units of enzyme activity turn over number.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II SEPARATION METHODS

Isolation and purification of enzymes. Classical Methods of purification and crystallization. Separation procedures based on molecular size, solubility difference and electric charge and selection adsorption, Criteria of purity.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III ENZYME ACTION

Mechanism of enzyme action - active site definition, lock and key hypothesis, induced fit hypothesis, mechanism of enzyme catalysis, enzyme substrate complexes, formation, mechanism of bisubstrate reactions, allosteric enzymes, feed back inhibition.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV ENZYME KINETICS

Factors influencing enzyme activity, derivation of Michalis - Menton equation. Line weaver - Burk plot, activators, inhibitor kinetics (competitive, un and non - competitive)

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V APPLICATIONS OF ENZYMES

Enzymes of clinical importance, application of enzyme in food, pharmaceuticals and medicine. immobilized enzymes-principals and application industrial application of enzymes.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference Books:

1. Harper's review of Biochemistry, David W.Martin,2002.
2. Principle of bio - chemistry,Lehniger,2004
3. Biochemistry, Stryer,2000.
4. Biochemistry, Voet &Voet,19980.
5. Fundamentals of Enzymology, Nicholas C. Prince,2002.
6. Enzymes , Palmer ,2004.

Web Resources:

- 1.<https://www.sciencedirect.com/bookseries/methods-in-enzymology/volumes>

Course Outcome:

- Plan and execute an enzyme assay
- Analyse enzyme kinetic data
- Analyse kinetic inhibition data and to determine the mechanism of inhibition
- Perform library research on a specific enzyme topic

CORE COURSE VIII

BIOENERGETICS AND METABOLISM

Internal : 25
External : 75
Exam Hours : 3

Semester : V
No. of Hours/ Week : 6
Credit : 5

Course objectives:

- To enable the differences between anabolic and catabolic processes in metabolism
- Use knowledge mechanism to follow metabolic pathways
- Understand the fundamentals of cellular metabolism of carbohydrates, protein, lipids, porphyrins, aminoacids and nucleic acids and their association with various metabolic diseases.
- Be able to describe how anabolic and catabolic processes are coupled to energetics from ATP hydrolysis
- Understand redox and electron transfer reactions in biological systems
- Understand that reaction coordinate diagrams are useful for thermodynamics of coupling anabolic and catabolic processes in metabolism.

UNIT I

Bioenergetics: Free energy and entropy changes in biological system, coupling of endergonic and exergonic processes. High energy phosphate compounds – Structure and importance of ATP. Biological oxidation – Enzymes involved in oxidation and reduction – oxidases, dehydrogenases, hydroperoxidase and oxygenases. Cytochrome P₄₅₀monooxygenase system.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Mechanism of oxidative phosphorylation – chemiosmotic theory, ATPases. Oxidative Phosphorylation – uncouplers, inhibitors, ionophores. Inhibitors of ETC. Malate and glycerophosphates shuttles.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Carbohydrate metabolism: Glycolysis and its energetics. Gluconeogenesis, oxidation of pyruvate to acetyl coA, TCA cycle and its energetic – anaplerotic reactions: Hexose monophosphate pathway, glycogenesis and glycogenolysis, glucuronic acid cycle: glyoxalate cycle: metabolism of galactose and fructose.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Lipid metabolism: Biosynthesis of fatty acids – biosynthesis and catabolism of triglycerides, phospholipids and glycolipids. Oxidation of fatty acids –, oxidation: Cholesterol - synthesis and degradation . ketogenesis: Plasma Lipoproteins.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Protein, Nucleic acid and Porphyrins metabolism: catabolism of amino acids – Deamination, decarboxylation, transamination – Glycogenic and ketogenic amino acids, urea – biosynthesis. Metabolism of purine and pyrimidine nucleotides. Biosynthesis and degradation of porphyrins, Heme.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

References Books:

1. Principles of Biochemistry – 7th edition, Lehninger, Nelson & CoX, Macmillanwort Publishers,2013
2. Biochemistry 29th edition Robert Harper's. Mcgraw, Hill,2012
3. Biochemistry,5th edition, Stryer W. H. Freeman. Donald Voet, J.G. Voet, John Wiley, JOHNWIVP & Publisher Kaye pace,2005
4. General Biochemistry - Weil (Wiley Eastern,India)
5. Essentials of Biochemistry – A.L. jain. 2nd edition. S. Chand Publications,2004.
6. Primer for the Exercise and Nutrition Sciences: Thermodynamics, Bioenergetics, metabolism, Christopher B. Scott.2010
7. Bioenergetics (Biochemistry Research Trends), Jeffrey W. Berkin2011
8. Bioenergetics: Energy Conservation and conversion (Results and Problems in cell Differebtation), Gunter Schafer,2008.

Course Outcome:

- Describe the structure of amino acids, proteins, enzymes, chemical messengers, carbohydrates, lipids and nucleicacids.
- Explain the function of the above listed biomolecules.
- Explain how biochemical energy is generated in the cells using principles of thermodynamics (free energy, enthalpy). Write coupled reactions to show how an endergonic reaction can occur by coupling it with a very exergonic reaction.
- WritethechemicalreactionsinvolvedinbiochemicalpathwaysthatproduceATP,suchas citric acid cycle and electron transport.
- Describe the metabolism of carbohydrates, lipids, proteins and amino acids. Write chemical reactions for the individual steps in each pathway.

Web Resourses:

1. <https://www.pdfdrive.com/bioenergetics-and-metabolism-d38219817.html>
2. <https://library.um.edu.mo/ebooks/b28050757.pdf>

CORE COURSE IX

PHARMACEUTICAL BIOCHEMISTRY

Internal : 25
External : 75
Exam Hours : 3

Semester : V
No. of Hours/ Week : 6
Credit : 5

Course Objectives:

- To enable the students understanding the classification, metabolism, Chemotherapeutic effect, Toxic effect of various drugs.
- To understand drug distribution, absorption, elimination of drug.
- To understand the chemical pathway of phase I and phase II reaction.
- To enable the students understanding antibiotics.
- To know about anaesthetics.

UNIT I CLASSIFICATION AND DISTRIBUTION OF DRUGS

Classification of drugs based on sources, mode of administration, site of action absorption of drugs. Drugs distribution and elimination role of kidney in elimination.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II DRUG METABOLISM

Chemical pathway of drug metabolism-phase I and phase II reactions, role of cytochrome, non microsomal reactions of drug metabolism, drug metabolic enzymes.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III CHEMOTHERAPY

Biochemical mode of action of antibiotics- penicillin and chloramphenicol, action of alkaloids, antiviral and antimalarial substances, biochemical mechanism of drug resistance.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV TOXICOLOGY

Adverse responses, side effects of drugs; allergy, drug intolerance, drug addiction, drug abuses and their biological effects.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V ANAESTHETICS AND ORGANIC PHARMACEUTICAL AIDS

Anaesthetics: General, local and gaseous anaesthetics- ether, vinyl ether, halogenated hydrocarbon like chloroform, cocaine, cyclopropane and nitrous oxide; intravenous anaesthetics- thiopental sodium, ketamine; antiseptic and disinfectants- phenols and related compounds.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference Books:

1. Pharmacology, N. Muruges, 1995.
2. Biochemical basis of Neuro Pharmacology, Cooper 2002.
3. Pharmaceutical chemistry, Chatwal, 1950.
4. Drug action in central nervous system, Carvey, 2002.
5. Toxicology, M.A. Subramanian, 2000.

Web Resources:

1. <https://content.kopykitab.com/eReader.html>
2. <https://www.schandpublishing.com/books/higher-education/medical/pharmaceutical-biochemistry/9788121942485/#.X-mTxlZaM8>
3. <https://pharmamedinfo.blogspot.com/2018/05/textbook-of-medical-biochemistry-by.html>

Course Outcome:

- Describe the history of pharmacy, development of pharmacy profession and industry in India.
- Describe various routes of drug administration, concept of dosage forms, unit operations involved in preparation of these dosage forms.
- Describes alternative system of medicines.
- Explain the factors which influence the design of pharmaceutical dosage forms.
- Summarize the factors influencing formulation of various dosage form like solution.

MAJOR BASED ELECTIVE I
MEDICAL LABTECHNIQUES

Internal:25
External : 75
Exam Hours:3

Semester :V
No. of Hours/ Week: 4
Credit:4

Course Objectives:

- To enable the students understanding the various diagnostics method for identifying the disease.
- The role of medical laboratory technology in the healthcare industry.
- Communication in the Laboratory setting.
- Accuracy, attention to detail, organization and quality control.
- Safe and accurate performance of laboratory procedures.
- How to collect the specimen and preservation for test.

UNIT I

Introduction to medical laboratory science, safety in the laboratory, General Laboratory instruments and equipments.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Collection of specimen and preservation, composition of weight, Measuring liquids and solids. Culture media and inoculation. Biochemical reaction, Antibiotic sensitivity test.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Development of bloodcells.Methods of estimation of haemoglobin. Blood sugar level.Blood urea level. Bleeding time, clottingtime.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Cholesteroltest,HDLcholesterol,Bilirubintest,Pregnancytest,Albuminandglobulinratio-Total cholesterol, lipoproteins-HDL,LDL,VLDL.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

VDRL test, Widal test, clinically diagnostics Enzymes-liver- AST, ALT, GT. Heart-AST, LDH, CK, Bone- Alkaline Phosphatase, Muscle-CPK. CRP test, HIV test, A.S.O test.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

References Books:

1. A Text Book of Microbiology ,C.K.J. Panikar andAnanthanarayanan.
2. Text Book of Medical Laboratory Techniques ,Muhargee Vol I, II,III.
3. Text book of Biochemistry,S.Nagini.

Web Resources:

1. <https://www.pdfdrive.com/medical-laboratory-technician-hematology-serology-blood-banking-and-immunohematology-e21321666.html>
2. <https://www.pdfdrive.com/bensons-microbiological-applications-laboratory-manual-in-general-microbiology-short-version-e185416575.html>

Course Outcomes:

- Recognize the role of medical laboratory technology in the context of providing quality patient healthcare.
- Perform basic clinical laboratory procedures using appropriate laboratory techniques and instrumentation in accordance with current laboratory safety protocol.
- Calculate and properly report laboratory data.
- Interpret laboratory results in accordance to laboratory protocol.
- Use effective written and verbal communication that represents competence and professionalism in the clinical laboratory setting.

SKILL BASED ELECTIVE II
HERBAL MEDICINE PRACTICAL

Internal:25
External : 75
Exam Hours:3

Semester :V
No. of Hours/ Week: 3
Credit:4

Course Objectives:

- To enable the students can get the practical knowledge about the analysis of various phytoconstituents present in materials.
 - Students to understand the soxhlet apparatus how to collect solvent sextracts.
 - Preparing TLC fingerprints of various plants extracts.
 - To understand the column chromatography.
 - To understand the separation of plant pigments using column chromatography.
1. Phytochemical Screening of medicinal plants using chemical tests for various groups of Phytoconstituents.
 2. Preparation of alcoholic and other organic solvents extracts of medicinal plants bysoxlet.
 3. Preparing TLC fingerprint profile of various plants extracts.
 4. Demonstration of column chromatography
 5. Estimation of Ascorbic acid
 6. Estimation of Alkaloids
 7. Separation of plant pigment by column chromatography

Reference Book:

1. Quality control methods for medicinal plant materials, world health organization,2000
2. Plant drug analysis-Wagner H.and Blatt,1996.
3. Text book of pharmacogenosy-Handa S and Kapoor V.K,2003
4. Phytochemical methods ,Harbone J.B and Mabry T.J,1984.

Course Outcome:

- Demonstrating initiative by beginning work in a timely manner without being reminded.
- Exhibiting professional appearance by adhering to laboratory dress code.
- Organizing work flow and determining priorities.
- Producing accurate work within the allotted time.
- Demonstrating awareness of own limitations, and seeking help when needed.
- Handling stressful situations calmly and efficiently.
- Demonstrates integrity when taking examinations, checking for mistakes, repeating questionable results and admitting and correcting mistakes.
- Adhering to all safety regulations in the laboratory

SKILL BASED ELECTIVE III

FOOD AND NUTRITION

Internal:25
External : 75
Exam Hours:3

Semester :V
No. of Hours/ Week: 2
Credit:4

Course Objectives:

- To enable the students can get knowledge about dietary intake for diseases like, returns diabetes, athrosclerosis, Ulcerativeetc.
- To provide students with the knowledge of basic terminology and several aspects of nutrition and the functions of food in healthy lifesustenance;
- To ensure that students are familiar with the food classification, nutrition during special conditions and role of special functionalfood;
- To equip students with knowledge and understanding of modern aspects of nutritional science and novel food usage

UNIT I

Source food composition, properties and storage of common foods, functions of food in relation tohealth–classificationoffoodbasedonnutrients,foodpreservation–foodaddictives.Typesof food - body building foods and protective foods – Bombcolorimeter.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Essential nutrients: fats, carbohydrates and proteins, Energy needs. Definition of unit of energy – Kcal, RQ, SDA, NPU, Basal metabolism – BMR – factors influencing BMR. Role of fiber in diet.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Micro and macro mineral nutrients: Distribution, sources, metabolic functions and deficiency manifestation vitamins – classification, source functions and Deficiency disorder – hyper and hypovitaminosis. Water and electrolyte balance.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Nutrition in different stages – Infants, children, adolescents, pregnant, lactating women and old persons.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Principles of diet therapy. Diet during stressed conditions, labourer and patients, therapeutic diets for anemia, malnutrition, obesity, diabetes mellitus and allergy.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

References Books:

1. Food Chemistry, L.GMeyers, CBS, 2004, Publishers & Distributors.
2. Food science, Polter 2001, CBS publishers & Distributors
3. Essential of food nutrition, Vol I & II, Swaminathan. M.S, Bangalore reprinting
4. A Test book of food and nutrition, Annie Fredrick 2006 lotuspress.

Web Resource

1. <https://www.pdfdrive.com/complete-food-and-nutrition-guide-e13023246.html>
2. <https://www.pdfdrive.com/nutrition-and-dietetics-text-books-online-e6071568.html>

Course Outcome:

- Locate and interpret government regulations regarding the manufacture and sale of food products.
- Discuss the major chemical reactions that occur during food preparation and storage.
- Discuss the important pathogens and spoilage microorganisms in foods.
- Explain the effects of common food preparation methods and food storage conditions on survival and growth of microbial contaminants. Obtain food protection manager certification
- Discuss basic principles of common food preservation methods.
- Discuss basic principles and practices of cleaning and sanitation in food preparation operations.

CORE COURSE X
MAJOR PRACTICAL III

Internal:25
External : 75
Exam Hours:3

Semester :VI
No. of Hours/ Week: 4
Credit:4

Course Objectives:

- To enable the students can get the practical knowledge about the moisture content, ash. content, analysis of micro nutrient and enzymes in food sample by specific method.
 - To understand the experiments of Carbohydrate, Protein, Fat content in food materials.
 - To enable the iron, phosphorous experiments.
 - To study to calcium in milk.
 - To determine the pH, salivary amylase.
1. Moisture content of food materials
 2. Ash content of food materials
 3. Estimation of carbohydrate by Anthrone method
 4. Estimation of protein by Lowry's Method
 5. Estimation of Fat content in food materials
 6. Estimation of iron – Dipyrindyl Method.
 7. Estimation of phosphorous- Submarrow Method.
 8. Estimation of calcium inMilk
 9. Determination of specific activity, effect of temperature and pH of alkaline phosphatases activity.
 10. Determination of specific activity, effect of temperature and pH of Salivary amylase activity

Reference Books:

1. Manuals in Biochemistry , Dr. J. Jayaraman ,1996
2. Manual in Biochemistry , Dr. Ramakrishnan ,1996
3. Practical Biochemistry ,Plummer ,2000
4. Introductory practical biochemistry , S.K. Sawhney,2001
5. Text books of clinical chemistry , Tietz,1975.

Course Outcome:

- Doing estimation of specific activity pH of salivary amylase
- Determine carbohydrate, protein and fat content analysis

CORE COURSE XI
CLINICAL BIOCHEMISTRY

Internal:25
External : 75
Exam Hours:3

Semester :VI
No. of Hours/ Week: 6
Credit:5

Course Objectives:

- To enable the students can get knowledge about the disease caused due to disorders of various metabolic reaction in living cells.
- To use basic laboratory skills and apparatus to obtain reproducible data from biochemical experiments;
- To implement experimental protocols, and adapt them to plan and carry out simple investigations;
- To analyse, interpret, and participate in reporting to their peers on the results of their laboratory experiments;
- To participate in and report orally on team work investigations of problem-based assignments;
- To build on their knowledge and understanding in tackling more advanced and specialised courses, and more widely to pursue independent, self-directed and critical learning.

UNIT I DISORDERS OF FLUIDS:

Disorder of fluids - electrolyte balance & disorders involving changes in H⁺ concentration-water toxicity, Dehydration. Renal function tests: normal and abnormal constituents of urine. Disturbances in blood clotting mechanism, haemophilia, anemia, porphyrias & anticoagulants.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II DISORDERS OF CARBOHYDRATE METABOLISM:

Sugar level in normal blood - maintenance of blood sugar concentration - endocrine influence on carbohydrate metabolism, hypoglycemia, hyperglycemia, glycosuria, renal threshold value, diabetes mellitus - classification, complications, glucose tolerance test, diabetic coma, diabetic ketoacidosis, glycogen storage disease, fructosuria, galactosemia & hypoglycemic agent.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III DISORDERS OF LIPID METABOLISM:

Lipid metabolism in liver and adipose tissue, plasma lipoproteins, cholesterol in health and diseases, fatty liver, atherosclerosis, lipid storage disease, hypolipoproteinemia and hyperlipoproteinemia.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV DISORDERS OF PROTEIN & NUCLEICACID METABOLISM:

Plasma proteins, their origin significance & variation in diseases, nitrogen balance, proteinuria, multiple myeloma, Wilson's disease. Liver function test, jaundice – Haemolytic, hepatic & obstructive jaundice. Phenyl ketonuria, alkaptanuria, tyrosinemia, albinism, gout - complications, Lesch nyhan syndrome, oroticaciduria.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V DISORDERS OF ENDOCRINE SYSTEMS:

Disorder associated with thyroid, pituitary, adrenal medulla & sex hormones.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Text Book:

Biochemistry for Medical Students , Ambika Shanmugam

Reference Books:

1. Text Book of Biochemistry, Nagini
2. Practical Clinical Biochemistry ,Harold varley ,1988.
3. Clinical Biochemistry ,chatterjee,2004.

Web Resources

1. <https://www.pdfdrive.com/clinical-biochemistry-books.html>
2. <https://www.pdfdrive.com/clinical-biochemistry-metabolic-and-clinical-aspects-e164553523.html>

Course Outcome:

- will be able to clinically assess the laboratory indicators of physiologic conditions and diseases
- will know the biochemical and molecular tools needed to accomplish preventive, diagnostic, and therapeutic intervention on hereditary and acquired disorders Course contents
- Assessment of the diagnostic performance of laboratory tests according to the clinical setting and prevalence of disease.

IMMUNOLOGY

Internal:25
External : 75
Exam Hours:3

Semester :VI
No. of Hours/ Week: 6
Credit:4

Course Objectives:

- To enable the students can get knowledge about the, immune system, immuneresponse and allergic reaction.
- The students will be able to identify the cellular and molecular basis of immune responsiveness.
- The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.
- The students will be able to describe immunological response and how it is triggered and regulated.
- The students will be able to demonstrate a capacity for problem-solving about immune responsiveness.

UNIT I IMMUNE SYSTEM

Introduction, lymphocytes, their origin and differentiation. Types of immunity, primary & secondary lymphoid organs, Humoral-Non specific body defences, surface membrane barrier, chemical defences, inflammation, cell mediated immunity, Antigen presenting cells - macrophages, dendritic cells, langerhans cell their origin and functional mechanism of phagocytosis, identification of cell types of immune system antigens - structure classification complements and their biological functions - types of immune responses, immune tolerance.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II IMMUNOGLOBULINS

Structure of immunoglobulins antibody specificity, biological function of immunoglobulins, monoclonal antibodies- preparation and applications. Antigen - Antibody interaction, antitoxins, opsonin, agglutination, bacteriolysin and precipitation.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III IMMUNOTECHNIQUES

Production of antisera, precipitation reaction, immunodiffusion, immunoelectrophoresis, radioimmunoassay, immunofluorescence, complement fixation and ELISA.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV IMMUNO HAEMATOLOGY

Blood group antigens, Rhesus incompatibility. Maternal response to other fetal antigens, other blood group system. Major histocompatibility complex, HLA-immune response gene and diseases, pathogenesis of autoimmune diseases.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV IMMUNITY TO INFECTION

Hypersensitivity reactions: Types of hypersensitivity, mechanism of T-Cell activation, macrophage activation and granuloma formation. Transplantation - Immunologic response, graft rejection mechanism and prevention of graft rejection. Immunosuppressive drugs.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Reference Books :

1. Immunolog, Wan Roitt -2004
2. Essential Immunology, IvanRoitt,2004
3. Immunology, Joshi, 2004,2005
4. Immunology, Tizard,2003

Web Resources

1. <https://www.pdfdrive.com/basic-immunology-functions-and-disorders-of-the-immune-system-e185969491.html>
2. <https://www.pdfdrive.com/kuby-immunology-7th-edition-2013-e44842271.html>.

Course Outcome:

- Locate and access immunological information relevant to area of study.
- Think critically about issues that involve immunology.
- Collaborate with peers and work effectively in a group.
- Articulate scientific processes related to immunology in written and/or oral format.
- Present immunologic data using scientific format.
- Present conclusions and explain logic to immunological issues.
- Read scientific literature about immunology.

CORE COURSE XIII

MAJOR PRACTICAL IV

Internal:25
External : 75
Exam Hours:3

Semester :VI
No. of Hours/ Week: 4
Credit:5

Course Objectives:

- To enable the students can get the practical knowledge about the urine analysis and estimation of abnormal constituent present in blood & blood grouping.
- To estimate the blood count

1. Qualitative tests of Urine, Normal, Abnormal constituents , sugar, protein (albumin) ketone bodies, bile pigments and bilesalts

2. Microscopic Examinations of urine – cast cells, crystals, pus cells.

3. Quantitative estimations of sugar in urine –Benedict's method.

4. Quantitative estimations in Blood.

a. Glucose – Orthotoluidine method.

b. Cholesterol – Zak's method.

c. Creatinine – Jaffe's method.

d. Urea - DAM method.

e. Protein - Lowry's method.

f. Uric acid - Phosphotungstate method.

g. Bilirubin - Malloy Evelyn method.

1. TC/DC count, haemoglobin Estimation method , Sahli's method, ESR count.

2. Blood grouping , Rh typing and PCV.

Course outcome:

Blood grouping, cholesterol, urea, protein, TC/DC count analysis

References Books :

1. Manuals in Biochemistry Dr. J. Jeyaraman 1996
2. Practical Biochemistry ,Plummer ,2000
3. Practical Clinical Biochemistry , Harold Varley ,1988
4. Introductory practical Biochemistry ,S.K. Sawhney, Randhir Singh,2001

MAJOR BASED ELECTIVE II

BIOTECHNOLOGY

Internal:25
External : 75
Exam Hours:3

Semester :VI
No. of Hours/ Week: 4
Credit:4

Course Objectives:

- To understand the technological aspect applied to molecular and microbial biology.
- To understand principles of animal culture, media preparation.
- To explain Invitro fertilization and embryo transfer technology.
- To describe meristem culture and clonal propagation of plants on a commercial scale.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To describe commercial production of fuels, microbial enzymes.

UNIT I

Fermentation biotechnology-biotechnology-scope and importance, basic principles of microbial growth, Bioreactor- batch and continuous bioreactor, fermentation culture medium, downstream processing, fermentation production of penicillin and vitamin B₁₂.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Food and industrial biotechnology- Fermentation production of yoghurt and cheese. Production of single cell protein; spirulina; cultivation and uses. Biofertilizers- blue green algae; cultivation and uses. Production of amylase and protease.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Molecular biotechnology- basic principles of cloning, introduction of foreign DNA in to host by particle bombardment gun, electrophoration and microinjection. Basic polymerase chain reaction (PCR), applications. Microarrays, the human genome project.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Animal and plant biotechnology- elementary details of animal cell and tissue culture, medium, transfection, targeted gene transfer, transgenic animals, plant cell and tissue culture, medium, totipotent, pluripotent cells, protoplast culture, artificial seeds and transgenic plants.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Environment biotechnology-biological fuel generation-ethanol and methane from biomass. Sewage treatment. Bioremediation: oil spill cleanup, bioleaching, IPR, Biosafety and hazards of environmental engineering.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

References Books:

1. Text book biotechnology by R.K.Santhyana, 2010 , Books & Applied (p) ltd.

Web Resource:

- 1.<https://www.pdfdrive.com/molecular-biotechnology-principles-and-applications-of-recombinant-dna-d33452385.html>
- 2.<https://www.pdfdrive.com/plant-biology-and-biotechnology-volume-ii-plant-genomics-and-biotechnology-e176062706.html>

Course Outcomes:

- Biotechnology in an historical perspective
- Scope and Importance of Biotechnology.
- Familiarization of the terms associated with plant tissue culture.
- Felt applications in the different domains of biotechnology.
- The concept of recombinant DNA technology.
- The concept of Genetically modified organisms.

MAJOR BASED ELECTIVE III

BIOINFORMATICS

Internal:25
External : 75
Exam Hours:3

Semester :VI
No. of Hours/ Week: 5
Credit:5

Course Objectives:

- To understand the students can get knowledge about sequence alignment phlogenetic studies.
- To set up a collaborative development environment to avoid redundancy and to facilitate future bioinformatics developments across organizations.
- To provide training in bioinformatics and support for bioinformatics projects hosted on the ARCAD platform.
- To collaborate (share software, workshop, mailing lists, and good practices) with other national as well as international bioinformatics platforms.
- To ensure quality control in bioinformatics research though a scientific user committee, documentation, data traceability and reliability, CECILL licences,indicator measurement.

UNIT I

Introduction to bioinformatics: History and scope – computer operating system- Internet- Bioinformatic sites on World Wide Web.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT II

Data bases: Importance and architecture of data bases-Types of databases – Biological Nucleic acid and protein structure-a-Application of data bases.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT III

Sequence alignment:Algorithm- Goals and type of alignment –Similarly studies –scoring – Deletion –Substitution- Parawise alignment-Multiple sequence Alignment-Identification of Domains-Sequence search.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT IV

Phylogenetic studies: phylogeny- homology and similarities- phylogenetic Tree-Tree Building methods- phylogenetic analysis Databases.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

UNIT V

Applications of bioinformatics- Industry- education-pharmacology-drug designing –Drug discovery-Target and optimization.

(Content – 15 Hrs, Assessment – 3 Hrs) (18 Hrs)

Text books

1. Bioinformatics – sequence and genome analysis- david W.mount.

References Books:

1. Bioinformatics- method and application, S.C.Rastogi
2. Basic Bioinformatics, Ignacimuthu
3. Introduction to bioinformatics, T.K. Attwood.

Course Outcomes :

- To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
- Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
- Explain about the methods to characterise and manage the different types of Biological data.
- Classify different types of Biological Databases.
- Introduction to the basics of sequence alignment and analysis.
- Overview about biological macromolecular structures and structure prediction methods.

Web Resources

1. <https://www.pdfdrive.com/basics-of-bioinformatics-lecture-notes-of-the-graduate-summer-school-on-bioinformatics-of-china-e165983343.html>
2. <https://www.pdfdrive.com/bioinformatics-algorithms-techniques-and-applications-wiley-series-in-bioinformatics-e185077187.html>