

**Shri Rawatpura Sarkar University,  
Raipur**



**Examination Scheme & Syllabus as per  
Outcome Based Education (OBE) and  
Choice Based Credit System (CBCS)  
for  
MASTER OF SCIENCE  
IN  
NUTRITION & DIETETICS  
Semester - I  
(Effective from the session: 2022-23)**

S. No.	Program Outcomes
1.	<b>Knowledge:</b> Gain knowledge in the fields of nutrition and health care.
2.	<b>Communication skills:</b> Communicate effectively with experts and society at large. Should be able to present or document research outcomes.
3.	<b>Team work:</b> Function effectively as an individual or a member of a team or leader in diverse teams in multidisciplinary settings.
4.	<b>Creative and critical thinking:</b> Identify, formulate, review research literature and analyze complex nutrition and health care related problems reaching substantiated conclusions.
5.	<b>Local challenges:</b> To inculcate skills to perform routine nutrition and dietetics protocols and handling of instruments by hands-on experience from lab projects, field projects and internships.
6.	<b>Service industry:</b> Takes up responsibilities in production, quality testing, designing and marketing which contribute for the growth of industry and thus increases the employability.
7.	<b>Regional challenges:</b> To create employable manpower in the health industry.
8.	<b>Global challenges:</b> To create awareness about issues related to environment and sustainability, and human health.
9.	<b>Realizes and promotes environment:</b> To sustainability through various eco- friendly measures that encourage judicious use of resources.
10.	<b>Scientific Reasoning using Quantitative /Qualitative Data:</b> Demonstrate the ability to understand cause-and-effect relationships, define problems, apply scientific principles, analyse, interpret and draw conclusions from quantitative/qualitative data, and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
11.	<b>Implement strategies for food access:</b> Implement strategies for food access, procurement, preparation and safety for individuals, families and communities.



# Shri Rawatpura Sarkar University, Raipur

## Faculty of Science

### Two Years M. Sc. Programme

#### Scheme of Teaching and Examination

#### M. Sc. First Semester Nutrition & Dietetics

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2022-2023)

S No.	Course Code	Course Title	Hours/ Week			Credits	Maximum Marks			Sem End Exam Duration (Hrs.)
			L	T	P		Continuous Evaluation	Sem. End Exam	Total	
1.	SMS08101T	Nutrition I: Fundamentals of Food Science	4	-	-	4	30	70	100	3
2.	SMS08102T	Nutrition II: Human Physiology	4	-	-	4	30	70	100	3
3.	SMS08103T	Nutrition III: Nutritional Biochemistry	4	-	-	4	30	70	100	3
4.	SMS08104T	Nutrition IV: Biochemical Techniques	4	-	-	4	30	70	100	3
5.	SMS08191P	Lab course: I (Combining Nutrition I and II)	-	-	4	2	15	35	50	5
6.	SMS08192P	Lab Course: II (Combining Nutrition III and IV)	-	-	4	2	15	35	50	5
7.	SMS08121P	Computer Application and Bioinformatics	-	-	2	2	15	35	50	2
<b>TOTAL</b>			<b>16</b>			<b>22</b>			<b>550</b>	

<b>Course Title</b>	<b>Nutrition I: Fundamentals of Food Science</b>				
<b>Course Code</b>	<b>SMS08101T</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
	4			4	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>• Basic knowledge of food and diet</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>• To understand the theories and techniques in food science and to get familiar with the practical applications</li> </ul>				
<b>Course Contents</b>	<p><b>UNIT I: CEREALS AND PULSES</b></p> <p><b>Cereals:</b> Starch: functions and properties</p> <p>Gelatinization, factors affecting gelatinization, Changes in cooked starches – gel formation, retrogradation, syneresis, Cereal protein – gluten, factors affecting gluten formation, Nutrient changes during different treatment methods of cereal grains, Role of natural leavening agents, Role of yeast.</p> <p><b>Pulses:</b> Decortication, Soaking and germination of pulses, Fermentation of pulses, Roasting and Puffing, Effect of cooking treatments on the nutrient composition, quality and quantity of legumes.</p> <p><b>UNIT II: ANIMAL FOODS</b></p> <p><b>Milk:</b> Composition and Nutritive Value of Milk, Types of milk, Properties of milk proteins – effect of heat, acid and phenolic compounds on milk</p> <p><b>Egg:</b> Composition and Nutritive Value of egg, Egg as a binding, foaming and emulsifying agent, Quality and Grading of Eggs.</p> <p><b>Meat:</b> Post mortem changes in meat – rigor mortis, curing, ageing and tenderization, Changes during cooking of meat.</p> <p><b>Poultry:</b> Advantages of white meat.</p> <p><b>Fish:</b> Classification, Characteristics of fresh fish, Spoilage, Nutritional importance of fish.</p> <p><b>UNIT III: FATS AND OILS, SUGARS</b></p> <p>Properties of fats and oils, Emulsions, Fat as emulsifying agent, Fat as leavening and shortening agent, Rancidity – types, mechanism and prevention, Factors affecting amount of fat absorbed during cooking, Fat replacers, Types of sugar, Sugar crystallization and caramelization, Factors affecting crystallization, Stages of sugar cookery, preparation of candies – crystalline and non - crystalline.</p> <p><b>UNIT IV: VEGETABLES AND FRUITS</b></p>				

	<p><b>Plant pigments:</b> Water insoluble and Water- soluble pigments, Factors affecting plant pigments on cooking: acid, alkali, metals, heat, Flavour compounds: terpenoids, flavonoids, Sulphur compounds and other volatile flavor compounds, Enzymatic Browning and its prevention, Physio – Chemical changes in Fruits and Vegetables- Ripening, Respiration and Textural changes.</p> <p><b>UNIT V SENSORY EVALUATION:</b></p> <p><b>Subjective evaluation techniques:</b> Difference tests: paired comparison test, duo-trio test, triangle test, Rating tests – Ranking, single sample, Two sample and Multiple sample difference Tests, Hedonic scaling, Numerical scoring, Composite scoring, Sensitivity tests and Descriptive tests, Objective tests to assess sensory properties of foods, Measurement of colour, viscosity, consistency and texture.</p>
<b>Course outcomes</b>	<p>Student will be able to</p> <ul style="list-style-type: none"> <li>• Learn about the basic knowledge of cereals and pulses products.</li> <li>• Understanding the animal food products and their uses.</li> <li>• Clear the basic concept of fat and its uses.</li> <li>• Know about the plant pigmentation and sensory evaluation.</li> <li>• At the end of the course the students should have an understanding of the concept of different types of food products.</li> </ul>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. B Srilakshmi, Food Science, New Age Publishers.</li> <li>2. Sunetra Roday, Food Science and Nutrition, Oxford Higher Education.</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Potter and Hotchkiss, <i>Food Science</i>, CBS Publishers and Distributors.</li> <li>2. L. Kathleen Mahan, Janice L. Raymond, Krause's Food &amp; The Nutrition Care Process, 14<sup>th</sup> edition. Elsevier Publisher.</li> </ol>

<b>Course Title</b>	<b>Nutrition II: Human Physiology</b>				
<b>Course Code</b>	<b>SMS08102T</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
	4			4	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>• Fundamental knowledge of Biological sciences.</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>• Provide a course of study in mammalian, principally human, systems physiology, building on knowledge of basic physiological principles.</li> </ul>				
<b>Course Contents</b>	<p><b>UNIT I: HUMAN ANATOMY</b></p> <p><b>Anatomy and Physiology:</b> definition, Structural plan, Directional terms, Anatomical position, Anatomical terms, planes and sections. Body cavities, abdominopelix regions, abdominopelix quadrants,</p>				

**Cell:** structure and functions, organelles, tissues, organ-brief review.

## **UNIT II: DIGESTIVE AND EXCRETORY SYSTEM**

**Gastrointestinal tract:** Structure and functions of, Structure and functions of liver, Functions of gastrointestinal secretions, Role of enzymes in digestion, Gut flora, role of prebiotics and probiotics in the maintenance of health of digestive system

**Kidney:** Structure and functions of Urine formation, Organic constituents of urine, Inorganic constituents of urine.

Water and electrolyte balance.

## **UNIT III: RESPIRATORY AND NERVOUS SYSTEM**

Structure and functions of nose and nasal cavity, pharynx, larynx, trachea, bronchi and lungs, Mechanism of respiration, Oxygen transport, Carbondioxide transport, Respiratory rate, Air volume in lung in different situations, Respiratory abnormalities; Hypoxia, Hypercapnia, carbon monoxide poisoning, Asphyxia, Cyanosis, High altitude sickness Emphysema, Asthma, COPD.

Structure of nerve cell, nerve impulses, Classification of nervous system, Structure and functions of brain, spinal cord, Peripheral nervous system, Cerebrospinal fluid, Blood Brain Barrier, Neurotransmitters, Alzheimer's disease, Parkinson's disease.

## **UNIT IV: BLOOD AND CIRCULATORY SYSTEM**

Structure and functions of heart and blood vessels, Pulmonary, Systemic and Portal circulation, Blood pressure, Heart rate, Factors affecting BP and heart rate, Regulation of Cardiac output.

Composition of blood, Plasma proteins; Functions, role in fluid balance, Organic and Inorganic compounds in plasma.

Blood Lipids – Chylomicrons, VLDL, LDL, HDL, Cholesterol, Triglycerides, Enzymes in blood, Blood coagulation.

## **UNIT V: ENDOCRINE SYSTEM**

**Endocrine glands:** Formation and secretion of hormones, Control of hormone secretion, mechanism of hormone action, Pituitary gland: Hormones secreted and their functions, abnormalities,

**Thyroid gland:** Structure of thyroid gland, formation of thyroid hormones, functions of thyroid hormones, hypothyroidism, hyperthyroidism, Parathyroid gland: Structure of parathyroid gland, functions of parathormone, hypo and hyper secretion of parathormone.

**Adrenal gland:** Structure of adrenal gland, secretions of adrenal cortex and their functions, hypoadrenalism, hyperadrenalism, Secretions of adrenal medulla and their functions.

	<p><b>Islets of Langerhans:</b> Structure of islets of Langerhans, functions of Insulin, deficiency of insulin, functions of glucagon</p> <p><b>Testes:</b> Structure of testes, functions of testosterone, deficiency of testosterone.</p> <p><b>Ovaries:</b> Structure of ovaries, functions of estrogens and progesterone</p>
<b>Course outcomes</b>	<p>Student will be able to recognize and identify principal tissue structures.</p> <ul style="list-style-type: none"> <li>At the end of the course students should have an enhanced knowledge and appreciation of mammalian physiology.</li> <li>understand the functions of important physiological systems including the cardio-respiratory, renal, reproductive and metabolic systems.</li> <li>understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting and ascent to high altitude, and how they can sometimes fail.</li> <li>be able to perform, analyze and report on experiments and observations in physiology.</li> <li>Learn the basic concept of human gland.</li> </ul>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>Guyton, Arthur, Text Book of Physiology, Prism Publisher.</li> <li>Chatterjee, C C, Human Physiology, Medical Allied Agency</li> <li>A.K Jain, Human Physiology</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>William Davis, Understanding Human Anatomy and Physiology, McGraw Hill</li> </ol>

<b>Course Title</b>	<b>Nutrition III: Nutritional Biochemistry</b>				
<b>Course Code</b>	<b>SMS08103T</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
	4			4	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>Fundamental knowledge of biology, chemistry and nutrition.</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>list major properties, functions, and important food sources of the nutrients;</li> <li>describe human nutrient and energy needs throughout the life span and in physical training;</li> <li>translate human nutrient and energy needs into daily food selection utilizing appropriate standards and guidelines;</li> <li>explain the significance of food practices to nutrition and disease prevention;</li> <li>effectively evaluate meal plans for nutritional adequacy, nutrient density, balance, variety, and calorie control; and</li> <li>evaluate and effectively communicate accurate nutrition information to target audiences.</li> </ul>				

<p><b>Course Contents</b></p>	<p><b>UNIT I: BODY FLUID AND CARBOHYDRATES</b></p> <p>Body fluids and water balance, Body composition</p> <p>Classification, sources, functions and requirements</p> <p>Digestion and absorption</p> <p>Transport, utilization and storage</p> <p><b>UNIT II: CARBOHYDRATE METABOLISM</b></p> <p>Glycolysis, TCA cycle, Pentose phosphate pathway, Glycogenesis, glycogenolysis, gluconeogenesis, Electron transport chain, Fermentation, alcohol metabolism.</p> <p>Inborn errors of Carbohydrate Metabolism- Glycogen storage diseases, Lactose intolerance, Galactosemia, Fructose intolerance</p> <p><b>UNIT III: AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS</b></p> <p>Amino Acids: Classification, Functions, Utilization of amino acids, Urinary excretion</p> <p>Proteins: Classification, sources and functions, Digestion and absorption, Transport and storage.</p> <p><b>Nucleic acids:</b> Types (DNA, RNA) and Functions, Components of Nucleic acids, Structure of DNA (Double Helix), Structure of RNA, Types of RNA</p> <p><b>UNIT IV: AMINO ACID METABOLISM</b></p> <p>Deamination, transamination, Decarboxylation, deamidation, Metabolism of tyrosine, tryptophan, phenylalanine, Metabolism of methionine, leucine and arginine, Urea cycle</p> <p><b>Amino acids:</b> balance, imbalance and toxicity, Inborn errors of amino acid metabolism</p> <p>PKU, Tyrosinemia, Maple syrup urine disease, Homocystinuria, Alkaptonuria.</p> <p><b>UNIT V: PROTEIN AND NUCLEIC ACID METABOLISM</b></p> <p>Synthesis of purines and pyrimidines (flow chart), Degradation of purines and pyrimidines</p> <p>Gout</p> <p>Protein synthesis, Components required, Initiation of Translation, Elongation of Peptide chain, Termination of peptide Chain, Inhibitors of protein synthesis, Chaperones and protein folding, Post transcriptional changes, Hypoalbuminemia.</p>
<p><b>Course outcomes</b></p>	<p>Student will be able to</p> <ul style="list-style-type: none"> <li>• Learn about basic concepts of carbohydrates.</li> <li>• Clear the basic concepts of essential and non- essential amino acid.</li> <li>• The course will provide understanding the basic knowledge of metabolism.</li> <li>• Learn about the general knowledge of protein and nucleic acid metabolism.</li> <li>• The end of course clear the basic concepts of nutritional biochemistry.</li> </ul>



<b>Text Books</b>	1. Manjula Shantaram, <i>Biochemistry &amp; Nutrition for B. Sc. Nursing</i> , Jaypee Brothers Medical Publishers (P) Ltd. 2. Ruma Singh, <i>Food and Nutrition for Nurses</i> , Jaypee Brothers Medical Publishers (P)Ltd.
<b>Reference Books</b>	1. D. C. Sharma & Devanshi Sharma, <i>Nutritional Biochemistry</i> , CBS Nursing. 2. U. Satyanarayana, U. Chakrapani, <i>Biochemistry</i> 6 edition.

<b>Course Title</b>	<b>Nutrition IV: Biochemical Techniques</b>				
<b>Course Code</b>	<b>SMS08104T</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
	4			4	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>Basic knowledge of Instrumentation</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>To make the students familiar with the basic instruments, their principles and various techniques involved in food biochemistry</li> </ul>				
<b>Course Contents</b>	<p><b>Unit I:</b> Principles and applications, simple, compound, phase-contrast and fluorescent microscopes. Electron microscopy: SEM and TEM. Centrifugation Techniques: Principles, type of centrifuges, density gradient centrifugation in isolation of cells, cell organelles and biomolecules.</p> <p><b>Unit II:</b> Electromagnetic spectrum, Beer Lambert's Law. Photometry, UV/VIS Spectrophotometry, Infrared spectroscopy, Atomic absorption spectroscopy, ESR and NMR spectroscopy. Mass spectroscopy (LC-MS, GC-MS). Fluorescent spectroscopy. Applications of different Spectroscopic techniques in Biology.</p> <p><b>Unit III:</b> Introduction and types of chromatography, paper, thin layer, gas, Gel permeation, ion-exchange, HPLC, FPLC and affinity chromatography and instrumental details of each. Applications of Chromatographic techniques in Biology.</p> <p><b>Unit IV:</b> Paper and gel electrophoresis, Polyacrylamide gel electrophoresis (native and SDS), Agarose gel electrophoresis, Blotting- Southern, Western and Northern blotting, Immunoblotting, Immunoelectrophoresis, DNA finger printing and ELISA.</p> <p><b>Unit V:</b> Nature and types of radiations, preparation of labelled biological samples. Detection and measurement of radioactivity, GM counter, Scintillation counter, Autoradiography, Flow cytometry. Safety measures in handling radioisotopes. RIA, non radiolabelling.</p> <ul style="list-style-type: none"> <li>Beneficial to various scientific areas including life sciences, chemical sciences, material sciences and environmental science.</li> </ul>				

	<ul style="list-style-type: none"> <li>• Provide scientific understanding of analytical techniques and detail interpretation of results.</li> <li>• Understand the working principles, construction and applications of the instruments often used in the studies related to various disciplines of Biological Sciences.</li> </ul>
<b>Course outcomes</b>	<p>Student will be able to</p> <ul style="list-style-type: none"> <li>• Learn biochemical techniques and its applications.</li> <li>• Understanding the basic knowledge of microscope.</li> <li>• Learn about the uses of spectroscopy.</li> <li>• Clear the basic concepts of chromatography.</li> <li>• End the course clear the general concept of biochemical techniques.</li> </ul>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Robyt J F, Biochemical Techniques Theory And Practice , CBS PUBLICATION</li> <li>2. Felix and Parthiban, Biochemical Techniques and Instrumentation, Astral Publishers</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Grosvenor and Kaulin, Biophysical And Biochemical Techniques, Magnum Publishing</li> <li>2. M. Shafiur Rahman, Handbook of Food and Bioprocess Modeling Techniques, CRC Press</li> </ol>

<b>Course Title</b>	<b>Lab course: I (Combining Nutrition I and II)</b>				
<b>Course Code</b>	<b>SMS08191P</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
			4	2	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>• Fundamentals of Food Science and Human Physiology theory paper.</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>• Understand basic microscopy.</li> <li>• Effectively perform the quantitative analysis of human anatomy and physiology.</li> </ul>				
<b>Course Contents</b>	<ol style="list-style-type: none"> <li>1. Microscope and its use.</li> <li>2. Microscopic appearance of prepared slide.</li> <li>3. Identification of blood cells by study of peripheral blood smear.</li> <li>4. Measurement of pulse and blood pressure.</li> <li>5. Presence of lipids in common foods.</li> <li>6. Importance of pectin in jelly making</li> <li>7. Milk alternatives for lactose intolerance.</li> <li>8. Sugar content in soft drinks.</li> <li>9. Standardization of portions for cooked food.</li> <li>10. Recording of Basal Mass Index.</li> </ol>				

<b>Course outcomes</b>	<p>Student will be able to</p> <ul style="list-style-type: none"> <li>Identify the significance of microscope.</li> <li>Analysis of factors governing metabolic activities inside human body.</li> <li>Identification of nutrients in food.</li> <li>Effect of external factors on food.</li> <li>Know about the standardization and BMI.</li> </ul>
<b>Text Books</b>	<ol style="list-style-type: none"> <li>K. R. Aneja, Experiments in Microbiology, Plant Pathology and Biotechnology, NewAge Publications.</li> <li>ShaliniSehgal, A Laboratory Manual of Food Analysis, I K International PublishingHouse</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>William Davis, Understanding Human Anatomy and Physiology,</li> <li>McGraw HillPotter and Hotchkiss, Food Science, CBS Publishers and Distributors</li> <li>T. Longvah, R. Ananthan, K. Bhaskarachar, K. Venkalah, Indian Food Composition Tables, ICMR, 2017.</li> </ol>

<b>Course Title</b>	<b>Lab Course: II (Combining Nutrition III and IV)</b>				
<b>Course Code</b>	<b>SMS08192P</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
			4	2	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>Nutritional Biochemistry and Biochemical Techniques theory paper.</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>Understanding the basic properties of nutrients.</li> <li>Effectively perform qualitative tests on Nutrients.</li> </ul>				
<b>Course Contents</b>	<p>Identification of carbohydrates (Qualitative Tests)</p> <p>Identification of proteins (Qualitative Tests)</p> <p>To study general properties of the enzyme Urease &amp; Achromatic time of salivary amylase.</p> <p>Estimation of glucose in urine by Benedict's methods</p> <p>Urine analysis - normal &amp; abnormal constituents of urine.</p> <p>Blood glucose estimation.</p> <p>Paper chromatography – ascending and descending – separation of amino acids and sugars.</p>				

	Western blotting Molecular weight determination of proteins by SDS-PAGE Quantitative estimation of proteins by spectrophotometric method
<b>Course outcomes</b>	Student will be able to <ul style="list-style-type: none"> <li>• Identify the presence of food nutrients in given sample.</li> <li>• Qualitative and Quantitative analysis of food samples.</li> <li>• Examine the blood glucose estimation.</li> <li>• Learn about the chromatography methods.</li> <li>• Learn about the biochemical techniques.</li> </ul>
<b>Text Books</b>	1. ManjulaShantaram, Biochemistry & Nutrition for B. Sc. Nursing, Jaypee Brothers Medical Publishers (P) Ltd. 2. Ruma Singh, Food and Nutrition for Nurses, Jaypee Brothers Medical Publishers (P) Ltd.Felix and Parthiban, Biochemical Techniques and Instrumentation, Astral Publishers
<b>Reference Books</b>	1. D. C. Sharma & Devanshi Sharma, Nutritional Biochemistry, CBS Nursing. 2. Grosvenor and Kaulin, Biophysical and Biochemical Techniques, Magnum Publishing.

<b>Course Title</b>	<b>Computer Application and Bioinformatics</b>				
<b>Course Code</b>	<b>SMS08121P</b>				
<b>Course Credits</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
			4	2	
<b>Prerequisites</b>	<ul style="list-style-type: none"> <li>• Basic science and introductory bioinformatics</li> </ul>				
<b>Course objectives</b>	<ul style="list-style-type: none"> <li>• The basic objective is to give students an introduction to the basic practical knowledge of computer and techniques of bioinformatics.</li> </ul>				
<b>Course Contents</b>	<p><b>Unit I:</b> Computer Basics, Introduction to computer networks, LAN, MAN, WAN &amp; Internet, Internet applications. Introduction to MS office, working with documents, worksheets and presentations.</p> <p><b>Unit II:</b> Concepts of Programming languages, Introduction to 'C' language, flowcharts and algorithms, introduction to data structure and database concepts, Object oriented concepts.</p> <p><b>Unit III:</b> Database concepts: Introduction, Key features, History; Database management systems, Types of database management systems, Structured Query language; Index: Introduction and forms; Biological Database: Introduction and Types.</p> <p><b>Unit IV:</b> Bioinformatics: Introduction, Bioinformatics databases, Importance of Bioinformatics; Analytical approaches, Components of Bioinformatics, Useful sites for researchers, Commercial use of bioinformatics; Bioinformatics in Life Sciences, Biocomputing, Bioinformatics in the area of genomics, Technical and legal issues, Role of Bioinformatician.</p>				

	<p><b>Unit V:</b> DNA sequence analysis: Gene structure and DNA sequences, Features of DNA structure analysis, DNA libraries and ESTs, Effect of EST data on DNA databases; Pair wise and multiple sequence alignment techniques; Phylogenetics; Analysis of Gene expression: Overview of microarray analysis, Micro arrays as tools for Gene expression analysis</p>
<p><b>Course outcomes</b></p>	<p>Student will be able to</p> <ul style="list-style-type: none"> <li>• To give students knowledge of and competence in use of bioinformatical methods central to conduction of molecular biological research projects.</li> <li>• Emphasis on bioinformatics related to exploration of proteins and includes analyses of sequences, database searches, sequence comparison, visualization and analysis of protein structures, and introduction to phylogenetic analyses.</li> <li>• Give an introduction to analysis of DNA sequences, genes and genomes, gene expression and systems biology.</li> <li>• To give students a basic competence in the use of bioinformatical tools.</li> <li>• Emphasizes the learning of bioinformatical tools in light of the student's knowledge of molecular biology.</li> <li>• Study the meaning and structure of biological information available in the existing databases.</li> </ul>
<p><b>Text Books</b></p>	<ol style="list-style-type: none"> <li>1. Arthur M Lesk. 2005. Introduction to Bioinformatics (Ed:2). Oxford university press, New York.</li> <li>2. Attwood, T.K. and Parrysmith, D.J. 2001. Introduction to Bioinformatics. Pearson Education (Singapore) Pvt. Ltd., New Delhi.</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Andreas D. Baxevanis and B. F. Francis Ouellette. 2005. Bioinformatics - A Practical guide to the analysis of Genes and Proteins (Ed:3). John Wiley &amp; Sons, Inc., Publications, US.</li> <li>2. David W Mount. 2004. Bioinformatics: sequence and Genome analysis (Ed:2). Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.</li> <li>3. Rastogi, S.C., Menderatta, M. and Rastogi, P. 2004. Bioinformatics - concepts, skills and applications. CBS Publishers &amp; Distributors, New Delhi</li> </ol>