**ANNEXURE - 19**

**DEPARTMENT OF BIO CHEMISTRY**

**Vision:**

* ***To be recognized as a centre for excellence in biochemistry that provides an atmosphere to acquire knowledge in molecular mechanisms underlying life (ie) the biological processes.***

## Mission:

* ***To foster a culture of scientific inquiry and critical thinking***
* ***To provide research based project activities in the emerging area of Biochemistry***
* ***To educate students in the application of scientific method***
* ***To acquire, generate and transmit new knowledge that leads to an understanding of the mechanisms of life to strive as individual and as a group to preserve the high standards of quality teaching and ethics.’***

**Programme Educational Objectives (PEO)**

|  |  |
| --- | --- |
| PEO1 | Natural navigators and nimble witted in diagnosing problems, in enlisting steps to rectify them and in providing the most effective solutions in the best possible way |
| PEO2 | Moralistic while demonstrating their academic caliber, in recognizing and acknowledging value systems, in making decisions, accepting responsibilities and while concerned about society and public issues and needs |
| PEO3 | Self-reliant in learning and in real life job situations through which they support their peers and become stable and reliable students, workers and citizens |
| PEO4 | Steadfast in shielding and nurturing environment and stimulate its sustainable growth for a bright future |
| PEO5 | Versatile and vibrant communicators in person and through other media. Vigilant/vital in prolonging the long winding richness and tradition of their mother tongue |
| PEO6 | Neoteric global citizens of our nation, who would take the nation’s pride around the world by adapting and adopting the scientific and technological developments |
| PEO7 | Civilized and confident graduates, who believe in lifelong learning with the socio-cultural changes in the generations to come |

**Programme Objectives (PO)**

|  |  |
| --- | --- |
| PO1 | Students would be able to recognize, demonstrate and understand the structure, functions of cellular organelles and macromolecules, disorders of metabolic pathways and cell signaling. Studied basic concepts in wide variety of application in diagnostics, drug action, laboratory techniques used for analysis of various biomolecules using various techniques such as chromatographic, centrifugation, spectroscopic, electrophoretic techniques. Practical skills to be develop by the students to face the existing & current clinical diagnosis challenges in the modern society. |
| PO2 | To import knowledge in prokaryotic and eukaryotic replication, transcription & translation and other molecular aspects such as mutation, DNA repair mechanism and genetic interactions. Comprehensive and detailed understanding of chemical basis of heredity and gene manipulations including vectors, selection and screening of recombinants and it’s expression in microbes, plants and animals. Genetic engineering skills are useful for the students to manage technical and business challenges in current needs in sustainable agriculture practices. |

|  |  |
| --- | --- |
| PO3 | Comprehensive regulation of metabolic pathways of carbohydrates, proteins, lipids, nucleic acids in prokaryotes and eukaryotes. Students will acquire knowledge in mechanism of enzyme action, application of enzymes and production of enzymes using fermentation technology. Acquiring professional based skills they can critically analyzed the problem which will be araised in the industry and environmental monitoring procedures. |
| PO4 | To demonstrate and understanding of qualitative and quantitative environmental issues such as pollution and its harmful effects on plant, animal and human beings and sustainable alternatives. Students will be exposed to life style associated disorders related to mental and physical health which will be induced by food additives and artificial food colors. Students can serve the society by creating awareness among the people about life style disorders. |
| PO5 | To acquire basic knowledge on structure and functions of hormones, metabolites in plants and animals. This course includes a detailed description of the immune response made in plant and human against auto antigens and foreign antigens. Students will gain proficiency in laboratory techniques in advanced biochemistry and able to apply the scientific methods using statistics and bioinformatics tools. Team work skills developed by the students in during practicals will help them to work in major projects. |

**PROGRAM SPECIFIC OUTCOME (PSO)**

|  |  |
| --- | --- |
| PSO1 | Develop laboratory skills techniques in diagnosing various diseases and disorders and be able to provide solutions for various health issues and to provide cost effective solutions to the society. |
| PSO2 | Self reliance in learning biochemistry help the students to address various challenges in their working environment. |
| PSO3 | Biochemistry skills are help the students to face business challenges in sustainable agriculture practices. |
| PSO4 | Biochemical and molecular knowledge gained will greatly assists the quantity and quality of food production, development of crops with enhance resistance to pest and disease and in the preparation of foods that improve immunity of human such as probiotics. |
| PSO5 | Knowledge gained by the students can serve the society by creative awareness among people about infectious disease and life style disorder such as diabetes, obesity and cancer that can be transformed to generations to generation. |

**PO - PEO MAPPING**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **PEO1** | 3 | 2 | 1 | 3 | 2 |
| **PEO2** | 3 | 3 | 1 | 2 | 3 |
| **PEO3** | 3 | 2 | 3 | 1 | 2 |
| **PEO4** | 3 | 2 | 3 | 3 | 1 |
| **PEO5** | 1 | 2 | 2 | 2 | 3 |
| **PEO6** | 1 | 2 | 2 | 3 | 2 |
| **PEO7** | 2 | 2 | 2 | 1 | 3 |

3-Strong 2- Medium 1- Low

**M.Sc BIOCHEMISTRY**

**CHOICE BASED CREDIT SYSTEM WITH OBE PATTERN**

**FOR THOSE WHO HAVE JOINED FROM THE ACADEMIC YEAR 2021–22 ONWARDS**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Subject** | **Code** | **Hrs.** | **Cr.** | **Adl. Cr.** | **Exam (Hrs)** | **Marks**  |
|  |  | **Int** | **Ext.** |
| **SEMESTER I** |
| Core | Chemistry of Biopolymers | 212804101 | 5 | 4 |  | 3 | 25 | 75 |
| Core | Principles of Biochemical and Biophysical Techniques | 212804102 | 5 | 4 |  | 3 | 25 | 75 |
| Core | Enzyme and Enzyme Technology | 212804103 | 5 | 4 |  | 3 | 25 | 75 |
| Elective  | Elective – I | 21280104/ 105 | 5 | 4 |  | 3 | 25 | 75 |
| Core Lab | Lab in Biochemical Techniques and Biochemical Analysis | 212804106 | 10 | 6 |  | 6 | 40 | 60 |
| SLC | In Plant Training \*Report;@Viva  | 218004128 | – | – | 3 | – | 40[\*30:@10] | 60[\*50:@10] |
| **SEMESTER II** |
| Core | Metabolic Regulation | 212804201 | 5 | 5 |  | 3 | 25 | 75 |
| Core | Microbial Biochemistry and Fermentation Technology | 212804202 | 5 | 4 |  | 3 | 25 | 75 |
| Core | Immunochemistry  | 212804203 | 5 | 4 |  | 3 | 25 | 75 |
| Core Lab | Lab in Microbiology and Molecular Biology | 212804204 | 9 | 6 |  | 6 | 40 | 60 |
| NME  | Human and Environment | 214604228 | 6 | 4 |  | 3 | 25 | 75 |
| SLC | Biophysics | 218004228 | – |  | 3 | 3 | – | 100 |
| **SEMESTER III** |
| Core | Genetics and Molecular Biology | 212804301 | 5 | 4 |  | 3 | 25 | 75 |
| Core | Clinical Biochemistry and Pharmacology | 212804302 | 5 | 4 |  | 3 | 25 | 75 |
| Core | Biostatistics and Bioinformatics | 212804303 | 5 | 4 |  | 3 | 25 | 75 |
| Elective  | Elective II | - | 5 | 4 |  | 3 | 25 | 75 |
| Core Lab | Lab in Advanced Biochemistry | 212804306 | 10 | 6 |  | 6 | 40 | 60 |
| SLC | Genomics  | 218004328 | – | – | 3 | 3 | – | 100 |
| **SEMESTER IV** |
| Core | Eukaryotic Gene Expression | 212804401 | 5 | 5 |  | 3 | 25 | 75 |
| Core  | Endocrinology and Neurochemistry | 212804402 | 5 | 4 |  | 3 | 25 | 75 |
| Core | Plant Biochemistry | 212804403 | 5 | 4 |  | 3 | 25 | 75 |
| Elective  | Elective III | - | 5 | 4 |  | 3 | 25 | 75 |
| Elective Major  | Project\*Report;@Viva  | 212804406 | 10 | 6 |  | – | 40[\*30:@10] | 60[\*50:@10] |
| SLC | Medical Laboratory Technology | 218004428 | – |  | 3 | 3 | – | 100 |
|  | **TOTAL** |  | **120** | **90** | **12** |  |  |  |

**Elective I**: 1. Cellular Biochemistry and Virology-212804104 **Elective III:**

 2. Bio Informatics -212804105 1. Environmental Biochemistry - 21280404

**Elective II:**1. Genetic Engineering -212804304 2. Nutritional Biochemistry - 212804405

 2. Diary Biochemistry – 212804305

**M.SC BIOCHEMISTRY: CHOICE BASED CREDIT SYSTEM WITH OBE PATTERN**

**FOR THOSE WHO HAVE JOINED FROM THE ACADEMIC YEAR 2021-22 ONWARDS**

**Core Subject GENETICS AND MOLECULAR BIOLOGY Code: 212804301**

 **SEMESTER III 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To know the inheritance patterns related to functional gene interactions at molecular level.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Study the basic knowledge of DNA structure and Mendel’s principles of genetics and learn about the molecular basis of mutagenesis | Up to K5 |
| **CO2** | Learn the process of Prokaryotic DNA synthesis and its inhibitors | Up to K5 |
| **CO3** | Understand the Mechanism of prokaryotic transcription and its inhibitors, gene regulation | Up to K5 |
| **CO4** | Understand the translational apparatus, synthesis of protein and its modifications and secretary proteins signal transduction process. | Up to K5 |
| **CO5** | Learn about the molecular mechanisms behind DNA damage and repair ,recombination technology, Bacterial transposons | Up to K5 |

 K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I:  **[15 Hrs]**

 **Basic concepts in Genetics :** Mendalian Genetics, Gene interaction, **Dominance** - complete, incomplete and co-dominance; multiple alleles: ABO Blood group, Pedigree analysis.

 **Mutation:** Molecular basis of mutagenesis, spontaneous and induced, types of mutagens, point and frame shift, chromosomal aberrations (monosomy, trisomy, translocations, inversions, duplications and deletions).

UNIT – II: **[15 Hrs]**

 **DNA** Base composition, Watson and crick model,DNA – topology – linking number.

**DNA replication,** Fidelity of replication, general principles – bidirectional replication, semi-conservative, discontinuous: RNA priming, various models of DNA replication including rolling circle.  **Enzymes Involved in DNA replication** - Topoisomerases, DNA polymerase, DNA ligase, primase, telomerase and other accessory proteins; Reverse transcriptase, Inhibitors of DNA replication.

UNIT – III: **[15 Hrs]**

 **Transcription:** Prokaryotic DNA dependent RNA polymerase – initiation, elongation and termination of transcription, Rho and sigma factors in transcription. Prokaryotic gene Regulation –Lac, Trp operon and Ara operon. Inhibitors of transcription.

UNIT – IV **[15 Hrs]**

 **Translation**: Structure and composition of prokaryotic protein synthesis – amino acid activation, Initiation, Elongation and Termination. Post translational modification; control of translation; Inhibitors of protein synthesis.

UNIT – V: **[15 Hrs]**

 **Repair of DNA** – Direct, photo reactivation, O6 methylation, DNA methyl transferase, excision repair, mismatch repair, recombination and error prone repair.

 **Recombination –**Holliday model. Bacterial transposons.

**TEXT BOOKS:**

1. Anthony J.F.Griffith, An introduction of Genetic Analysis, Freeman W.H. and Company, New York, 6th Edition,1998.
2. Robert J.Brooker, Genetics – Analysis and Principles, Addison – Wesley Publishers, California. 1999.
3. Watson, Molecular Biology of Gene, The Benjamin Publishing Company, California, Inc., 4th Edition,1998.

**REFERENCES:**

1. Anthony Griffiths J.F., Modern Genetic Analysis, Freeman W.H. and Company, New York.1999.
2. Robert Tamarin H., Principles of Genetics, 6th Edition, WCB, McGraw –Hill Companies, Boston.1999.
3. Ajay Paul, Text book of cells & molecular Biology, First edition, Books & Allied Publisher, 2015

**WEB RESOURCES:**

1. https://openoregon.pressbooks**.**
2. https://en.wikipedia.org > wiki/prokaryotic DNA replication
3. www.ncbi.nlm.nih.gov › books › NBK9850[bio.libretexts.org › ... › Unit III: Genetics › 15: Genes and Proteins](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=26&ved=2ahUKEwjOkIud-dfnAhVJzDgGHV8vAsUQFjAZegQICRAB&url=https%3A%2F%2Fbio.libretexts.org%2FBookshelves%2FIntroductory_and_General_Biology%2FBook%253A_General_Biology_(OpenStax)%2F3%253A_Genetics%2F15%253A_Genes_and_Proteins%2F15.2%253A_Prokaryotic_Transcription&usg=AOvVaw0tj95EKD2fuhTpZBz62um-)

04*.* www.biologydiscussion.com › cell › translation-in-prokaryotes-genetics 05.www.ncbi.nlm.nih.gov › books › NBK21114 [en.wikipedia.org › wiki › Post-translational\_modification](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=16&ved=2ahUKEwjku6LT-9fnAhX0yzgGHdgUAM0QFjAPegQIBBAB&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FPost-translational_modification&usg=AOvVaw0mHxO4CHtRDewgzrf1Z1I7)
06. www.dentalcare.com › en-us › professional-education › ce-courses › i...

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Introduction to Molecular biology  | 2 | Content focused Method | OHP sheet |
| 1.2 | Mendalian Genetics | 2 | Teacher – Centered method | Black Board |
| 1.3 | Introduction to genetics and Mendel’s law | 1 | Teacher – Centered method | Black Board |
| 1.4 | Complete and Incomplete dominance | 1 | Teacher – Centered method | Black Board |
| 1.5 | Co dominance | 1 | Teacher – Centered method | Black Board |
| 1.6 | Multiple alleles-ABO blood group | 3 | Teacher – Centered method | Black Board |
| 1.7 | Pedigree analysis | 1 | Teacher – Centered method | Black Board |
| 1.8 | Introduction to mutation and types of mutagens | 1 | Teacher – Centered method | Black Board |
| 1.9 | Point and frame shift mutation | 2 | Teacher – Centered method | Black Board |
| 1.10 | Chromosomal aberrations | 1 | Teacher – Centered method | Black Board |
| UNIT – II [15 Hrs] |
| 2.1 | DNA Base composition, Watson and crick model,DNA – topology – linking number. | 3 | Teacher – Centered method | Black Board |
| 2.2 | Introduction to DNA replication - Types of DNA replication | 3 | Teacher – Centered method | Black Board |
| 2.3 | Mechanism of DNA replication in prokaryotes | 3 | Content-Focused method | LCD Projector |
| 2.4 | Enzymes involved in DNA replication | 2 | Teacher – Centered method | Black Board |
| 2.5 | Rolling circle model of DNA replication | 2 | Teacher – Centered method | Black Board |
| 2.6 | Inhibitors of DNA replication | 2 | Teacher – Centered method | Black Board |
| UNIT – III [15 Hrs] |
| 3.1 | Introduction about transcription | 1 | Teacher – Centered method | Black Board |
| 3.2 | RNA polymerase and promoter | 3 | Teacher – Centered method | Black Board |
| 3.3 | Mechanism of transcription in prokaryotes | 4 | Teacher – Centered method | Black Board |
| 3.4 | Prokaryotic gene regulation-lac operon | 3 | Teacher – Centered method | Black Board |
| 3.5 | Trp operon and Ara operon | 3 | Teacher – Centered method | Black Board |
| 3.6 | Inhibitors of transcription | 1 | Content-Focused method | OHP Sheet |
| UNIT – IV [15 Hrs] |
| 4.1 | Introduction about translation | 1 | Content-Focused method | OHP Sheet |
| 4.2 | Structure and composition of mRNA,rRNA,tRNA | 4 | Content-Focused method | OHP sheet |
| 4.3 | Mechanism of translation in prokaryotes | 4 | Content-Focused method | LCD Projector |
| 4.4 | Post translational modifications | 3 | Content-Focused method | OHP sheet |
| 4.5 | Inhibitors of translation | 3 | Content-Focused method | OHP sheet |

|  |  |  |
| --- | --- | --- |
|  | UNIT – V [15 Hrs] |  |
| 5.1 | Introduction about DNA repair | 1 | Content-Focused method | LCD Projector |
| 5.2 | Direct DNA repair-Photo reactivation,o6 methylation and DNA methyl transferase | 4 | Content-Focused method | LCD Projector |
| 5.3 | Excision repair, Mismatch repair | 3 | Content-Focused method | LCD Projector |
| 5.4 | Recombination and error prone repair | 3 | Content-Focused method | LCD Projector |
| 5.5 | Holiday model of recombination | 2 | Content-Focused method | LCD Projector |
| 5.6 | Bacterial transposons | 2 | Content-Focused method | LCD Projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 2 | 3 | 3 | 2 | 2 |
| **CO2** | 1 | 3 | 3 | 1 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 1 | 3 |
| **CO5** | 2 | 3 | 3 | 2 | 3 |

3 - Strong; 2 – Medium; 1 - Low

**COURSE DESIGNER: Miss M.GLORY JASMINE RANI**

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**Core Subject CLINICAL BIOCHEMISTRY AND PHARMACOLOGY**

 **SEMESTER III Code: 212804302**

 **5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To study the bio chemical process within the human body with special reference to health and human diseases, clinical features, diagnosis and treatment . And also to learn how drugs can be utilized optimally in the treatment of diseases.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Learn about the diagnostic importance and clinical aspects of carbohydrates and lipid metabolism | Up to K5 |
| **CO2** | Know about the disorders of amino acid, protein metabolism and the liver diseases. | Up to K5 |
| **CO3** | Acquire knowledge on kidney function test, kidney diseases and learn to analyze the abnormal constituents of urine , | Up to K5 |
| **CO4** | Understanding the biotransformation of drugs and how drugs can be utilized optimally in the treatment of various diseases, | Up to K5 |
| **CO5** | Learn the blood collection , processing and transfusion process and analyze the sample (CSF and amniotic fluid) | Up to K5 |

K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **Disorder of Carbohydrate Metabolism**: Hypo and hyperglycemia, glycosuria and its types, Diabetes mellitus- causes and its types, Secondary changes associated with Diabetes mellitus, GTT – Laboratory diagnosis of early and latent diabetes, Diabetic coma, Hypoglycemia agents.

 Glycogen Storage Diseases, Galactosemia, Fructosuria, Pentosuria, Lactose intolerance.

 **Disorders of lipid metabolism**: Plasma lipoproteins metabolism – Disorders of plasma lipoproteins, Fatty liver, Atherosclerosis and Obesity.

UNIT – II:  **[15 Hrs]**

 **Disorders of protein metabolism** **–** Phenylketonuria, Alkaptonuria, Albinism, Hartnup syndrome and Tyrosinemia. Plasma proteins, Gamma globulinemia, Proteinuria, and Wilson’s disease.

 **Disorders of Nucleic Acid Metabolism**: Gout – Primary and Secondary. C-Reactive protein test, Lesch-Nyhan Syndrome, Orotic aciduria. immunological test for pregnancy.

 **Liver diseases**: Liver function test, laboratory findings in jaundice, cirrhosis, hepatic coma.

UNIT – III: **[15 Hrs]**

 **Kidney and Urine**: Diabetes insipidus, Fanconi Syndrome, Renal function test, Nephrotic syndrome, Acute and chronic glomerulonephritis, acute and chronic renal failure, kidney stones and its laboratory findings, acute and chronic renal failure, kidney stones (Blood, bilirubin, ketone bodies, bile salts, porphyrin, uric acid and protein).

UNIT – IV: **[15 Hrs]**

 **Principles of Pharmaco-dynamics and Pharmaco Kinetics**: Chemical pathways of drug metabolism phase I, phase II, phase III and phase IV reactions, Pharmaco Kinetics Role of CYP450, Mode of action of sulfonamides, Anti-viral substances, and cancer chemotherapy.

UNIT – V:  **[15 Hrs]**

 **Cerebrospinal fluid** - composition, clinical investigation of CSF in meningitis, central hemorrhage and thrombosis.

**Amniotic Fluid:** composition and analysis of amniotic fluid.

**Gastrointestinal disorders**: ulcer – peptic ulcer, gastric ulcer, duodenal ulcer, clinical features and medical treatment, appendicitis, pathophysiology, diagnosis and treatment.

 Reproductive disorders – Ammonorehae, Ectopic pregnancy, Prenatal diagnosis, PCOD and Endometriosis – symptoms, diagnosis, treatment and prevention.

**TEXT BOOKS:**

1. Alan H.Gowenlock, Varleys Practical Clinical Biochemistry,6th Edition,Year-1996. CBS Publishers and Distributors, New Delhi.
2. Harrison, Principles of Internal medicine Vol. I, Vol. II, 16th Edition, Year-2005. McGraw – Hill Medical Publishing Division, New Delhi.
3. Parimoo P., A Text of Medicinal Chemistry, CBS Publishers and Distributors, Ist Edition.Year-1999.

**REFERENCES:**

1. William O.Foye, Thomas L.Lenke, David A.Williams, Principles of Medicinal Chemistry, 4th Edition, B.I.Waverely Pvt., Ltd., New Delhi, 1995.
2. Alan H Gowelock, Varley’s Practicla Clinical Biochemistry, Sixth edition, CBS Publishwers & Distributors, 2002.
3. 03. Carl A Burtis, TETZ Text Book of Clinical Chemistry, Harcourt Brace & Company Asia Pvt Ltd, third edition, 1999.

**WEB RESOURCES:**

1. https://www.msdmanuals.com/
2. www.slideshare.net
3. www.medicinenet.com

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Introduction to carbohydrates metabolism | 1 | Teacher – Centered method | Black Board |
| 1.2 | Hypoglycemia | 1 | Teacher – Centered method | Black Board |
| 1.3 | Hyper glycemia | 2 | Teacher – Centered method | Black Board |
| 1.4 | Diabetes mellitus | 2 | Content-Focused method | OHP Sheet |
| 1.5 | Glucose tolerance test | 2 | Content-Focused method | OHP Sheet |
| 1.6 | Diabetic coma | 1 | Teacher – Centered method | Black Board |
| 1.7 | Glycogen storage disease | 2 | Teacher – Centered method | Black Board |
| 1.8 | Plasma lipoproteins metabolism | 2 | Content-Focused method | OHP Sheet |
| 1.9 | Atherosclerosis | 1 | Content-Focused method | OHP Sheet |
| 2.0 | Obesity | 1 | Content-Focused method | OHP Sheet |
| UNIT – II [15 Hrs] |
| 2.1 | Introduction to amino acid metabolism | 2 | Teacher – Centered method | Black Board |
| 2.2 | Disorders of protein metabolism | 3 | Teacher – Centered method | Black Board |
| 2.3 | Liver function test | 2 | Content-Focused method | OHP Sheet |
| 2.4 | cirrhosis | 1 | Content-Focused method | OHP Sheet |
| 2.5 | laboratory findings in jaundice | 1 | Content-Focused method | OHP Sheet |
| 2.6 | hepatic coma | 1 | Teacher – Centered method | Black Board |
| 2.7 | Introduction to disorders of Nucleic Acid Metabolism | 1 | Teacher – Centered method | Black Board |
| 2.8 | Gout | 1 | Teacher – Centered method | Black Board |
| 2.9 | C-Reactive protein test | 1 | Teacher – Centered method | Black Board |
| 2.10 | Lesch-Nyhan Syndrome, Orotic aciduria | 1 | Teacher – Centered method | Black Board |
| 2.11 | Immunological test for pregnancy. | 1 | Content-Focused method | OHP Sheet |
| UNIT – III [15 Hrs] |
| 3. 1 | Diabetes insipidus | 2 | Teacher – Centered method | Black Board |
| 3.2 | Fanconi Syndrome | 1 | Teacher – Centered method | Black Board |
| 3.3 | Renal function test | 4 | Content-Focused method | OHP Sheet |
| 3.4 | Acute and chronic glomerulonephritis | 2 | Content-Focused method | OHP Sheet |
| 3.5 | laboratory findings ofacute and chronic renal failure, kidney stones | 3 | Content-Focused method | OHP Sheet |
| 3.6 | acute and chronic renal failure, kidney stones | 3 | Teacher – Centered method | Black Board |
| UNIT – IV [15 Hrs] |
| 4.1 | Chemical pathways of drug metabolism phase I, phase II reactions | 4 | Content-Focused method | OHP Sheet |
| 4.2 | Phase III and Phase IV  | 4 | Content-Focused method | OHP Sheet |
| 4.3 | Pharmaco Kinetics | 2 | Content-Focused method | OHP Sheet |
| 4.4 | Role of CYP450 | 2 | Content-Focused method | OHP Sheet |
| 4.5 | Mode of action of sulfonamides | 1 | Content-Focused method | OHP Sheet |
| 4.6 | Anti-viral substances | 1 | Teacher – Centered method | Black Board |
| 4.7 | Cancer chemotherapy | 1 | Teacher – Centered method | Black Board |
| UNIT – V [15 Hrs] |
| 5.1 | Cerebrospinal fluid | 4 | Content-Focused method | OHP Sheet |
| 5.2 | Amniotic Fluid | 2 | Content-Focused method | OHP Sheet |
| 5.5 | Ulcer | 1 | Content-Focused method | OHP Sheet |
| 5.6 | appendicitis | 2 | Content-Focused method | OHP Sheet |
| 5.7 | Ammonorehae, Ectopic pregnancy | 3 | Content-Focused method | OHP Sheet |
| 5.8 | Prenatal diagnosis PCOD and Endometriosis | 3 | Content-Focused method | OHP Sheet |

**MAPPING OF COS WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 1 | 3 | 3 | 1 | 2 |
| **CO3** | 3 | 3 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 1 | 2 |
| **CO5** | 2 | 3 | 3 | 2 | 1 |

**COURSE DESIGNER: Mrs. N.VIJAYALAKSHMI**

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**Core Subject BIOSTATISTICS AND BIOINFORMATICS Code: 212804303**

 **SEMESTER III 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To provide the basic explaining principles of statistical methods as applied to biological problems.***
* ***To make familiar with the art of using different research methods and techniques.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Students will gain knowledge of advanced concepts of design of research process | Up to K5 |
| **CO2** | Students will acquire knowledge on methods to carryout basic arithmetical processing and probability based calculations of numerical data | Up to K5 |
| **CO3** | Enrichment of students with knowledge of parameters tests and Non parameters test that are essential for mathematical validation of numerical data of research | Up to K5 |
| **CO4** | Imparting of students with knowledge of acquiring nucleic acids and protein database for verification of sequence and identification of individuals using biological traits | Up to K5 |
| **CO5** | Understanding of sequence alignment methods and possible application in genomics and evolutionary studies | Up to K5 |

K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **Descriptive Statistics:** Pie chart, Histogram and Linediagram-Measures of central tendency – Mean, Median, Mode, Measures of Variation standard deviation and C.V. Skewness and kurtosis, Simple correlation scatter diagram method, Karl Pearson’s coefficient of correlation, Rank correlation coefficient, concurrent deviation method. Regression equation and regression lines (Problem & Theory)

UNIT – II: **[15 Hrs]**

 **Probability:** Events – probability, addition rule, multiplication rule and conditional rule. Binomial distribution – properties, constant and importance of Binomial distribution (Problem & Theory).

UNIT – III: **[15 Hrs]**

 **Testing Hypothesis**: Students ‘t’ test, Chi - Square test and association of attributes, goodness of fit, ANOVA – One way and two way classification (Problem & Theory).

UNIT – IV: **[15 Hrs]**

 **Introduction to bioinformatics**: Introduction to bioinformatics, Definition, scope, Biological data base – 10 composite, bioinformatics relation with molecular biology, phylogenetic analysis**,** 20 sequence alignment, Local, Multiple, Global**.**

UNIT – V: **[15Hrs]**

 **Biological Databases and it’s Types:** Introduction to biological databases and it’s types:Nucleic acid databases ( gen Bank, DDBJ and EMBL), Protein databases (Primary, composite and Secondary), Specialized Genome databases (SGD,TIGR and ACeDB), Structure classification databases (CATH,SCOP and PDBsum) and Structure database (PDB)

**TEXT BOOKS:**

1. Richard C, Deonier, computational Genome Analysis –An introduction, Springer.
2. Gupta S.P., Statistical Methods, S.Chand and Co Ltd, New Delhi.28th Edition, Year-2000.
3. Pranab Kumar Banerjee, Introductrion to biostatistics, Revised edition 2005.
4. Irfan A. Khan & Atiya Khanum, Fundamentals of Biostatistics First edition – 1994.

**REFERENCES:**

* 1. Gurumani, An Introduction to Biostatistics, MJ Publication, Chennai - 600 005, Year-2001.
	2. Robert R.Sokal and F.James Rohlf,Introduction to Biostastics,twelth edition,W.H.Freeman Company/New York,1987.

**WEB RESOURCES:**

1. https://www.biostat.washinton.edu
2. https://www.britannica.com
3. https://mleg.cse.sc.edu
4. https://www.khanacademy.org
5. https://bio1520.biology.setech.edu
6. https://courses.cs.ut.ee

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Pie chart, Histogram and Linediagram  | 1 | Teacher – Centered method | Black Board |
| 1.2 | Mean,Median,Mode,Hormonic & Geometric mean | 5 | Teacher – Centered method | Black Board |
| 1.3 | Range, Quartile, Mean & Standard deviation | 5 | Teacher – Centered method | Black Board |
| 1.4 | Correlation and Rank Correlation | 2 | Teacher – Centered method | Black Board |
| 1.5 | Regression | 2 | Teacher – Centered method | Black Board |
| UNIT – II [15 Hrs] |
| 2.1 | Introduction | 1 | Teacher – Centered method | Black Board |
| 2.2 | Addition rule | 4 | Teacher – Centered method | Black Board |
| 2.3 | Multiplication rule | 3 | Teacher – Centered method | Black Board |
| 2.4 | Conditional rule | 3 | Teacher – Centered method | Black Board |
| 2.5 | Bionomial Distribution | 4 | Teacher – Centered method | Black Board |
| UNIT – III [15 Hrs] |
| 3.1 | Student ‘t’ Test | 3 | Teacher – Centered method | Black Board |
| 3.2 | Co-efficient of variation | 2 | Teacher – Centered method | Black Board |
| 3.3 | One way ANOVA | 2 | Teacher – Centered method | Black Board |
| 3.4 | Two way ANOVA | 2 | Teacher – Centered method | Black Board |
| 3.5 | Goodness of fit | 3 | Teacher – Centered method | Black Board |
| 3.6 | Chi square test | 3 | Teacher – Centered method | Black Board |
| UNIT – IV [15 Hrs] |
| 4.1 | Introduction to Bioinformatics | 3 | Content-Focused method | LCD projector |
| 4.2 | Scope, primary composite | 3 | Content-Focused method | LCD projector |
| 4.3 | Phylogenetic analysis | 3 | Content-Focused method | LCD projector |
| 4.4 | Sequence alignment -Local | 3 | Content-Focused method | LCD projector |
| 4.5 | Sequence alignment –Multiple, Global | 3 | Content-Focused method | LCD projector |
|  | UNIT – V [15 Hrs] |  |
| 5.1 | Introduction to Biological databases | 2 | Content-Focused method | LCD projector |
| 5.2 | Nucleic acid databases | 4 | Content-Focused method | LCD projector |
| 5.3 | Protein databases | 3 | Content-Focused method | LCD projector |

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| 5.4 | Specialized genome database | 3 | Content-Focused method | LCD projector |
| 5.5 | Structural database | 3 | Content-Focused method | LCD projector |

**MAPPING OF POs WITH COs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 1 | 1 | 1 | 3 |
| **CO3** | 3 | 1 | 1 | 1 | 2 |
| **CO4** | 3 | 3 | 3 | 2 | 2 |
| **CO5** | 3 | 3 | 3 | 3 | 3 |

3 - Strong; 2 – Medium; 1 - Low

**COURSE DESIGNER: Dr. R. ANITHA JOTHI**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**Elective Major GENETIC ENGINEERING Code: 212804304**

 **SEMESTER III 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To understand invitees DNA technologies that are used to isolate genes from an organisms manipulate them into another cell systems for specific genetic trait.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Acquire knowledge about biology of plasmids, phages and their uses in diagnosing different cloning systems using DNA Cloning | Up to K5 |
| **CO2** | Students will know the applications of Detection and characterizations of recombinants | Up to K5 |
| **CO3** | Students will acquire knowledge in Gene Manipulation in Plants | Up to K5 |
| **CO4** | Students will have exposure in advancements in Transgenic animals | Up to K5 |
| **CO5** | Students will acquire knowledge in the tools of Recombinant DNA Technology | Up to K5 |

K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **DNA Cloning:** Restriction enzymes, random shear, complementary DNA, cloning vectors, Expression vectors, Shuttle Vectors – pBR 322, pUC18, M13 Filamentous phage, cosmids, Plasmids, Yeast Vectors. Ligation of sticky ends, blunt end ligation, homopolymer tailing. Techniques involved in transfer of genes in E coli, yeast cell, plant cell, mammalian cell and embryo.

UNIT – II: **[15 Hrs]**

 **Detection and characterization of recombinants** – Gene markers, Plus and Minus Screening, Immunochemical methods, hybridization methods. Identification of translation product of a cloned gene – Hybrid released translation (HRT) and Hybrid arrest translation (HART) techniques, Optimizing and Maximizing the expression of cloned genes.

UNIT – III: **[15 Hrs]**

 **Gene Manipulation in Plants:** Transgenic plants, Gene transfer through *Agrobacterium tumefaciens*, Herbicide resistant plants, virus resistant plants, pest resistant plants, Delaying of fruit ripening.

UNIT – IV:  **[15 Hrs]**

 **Transgenic animals** - methods, gene therapy, Homologous recombination and allele replacement – genes knock out.

UNIT – V: **[15 Hrs]**

 **Recombinant DNA Technology:** DNA micro array, DNA finger printing – PCR, RTPCR RFLP, RAPD, DGGE and Drug design, Human Genome project.

**TEXT BOOKS:**

1. Bernard R.Glick, Molecular Biotechnology – Principles and Applications of Recombinant DNA, ASM Press, Washington, D C.2nd Edition, Year-1998.
2. James D.Watson Michacl Gilman, Recombinant DNA, 6th Edition, 2007. Pearson International edition, New York.
3. Old and Primrose S.B., Principles of Gene Maniputiulation, 2ndEdition,Year-1994. Blackwell Scientific Publication, London.

**REFERENCES:**

1. Brown C.M., Campbell I., Priest F.G., Introduction to Bio Technology, Blackwell Scientific Publications, London.Year-1998.
2. Pamela Peters, Biotechnology, A Guide to genetic engineering, WCB McGraw – Hill, Boston.Year-1992.
3. T.A.Brown,Gene Cloning and DNA Analysis,Seventh edition by John Wiley and sons ,Ltd.,2016

**WEB RESOURCES:**

1. https://www.teachengineering.org/lessons/view/
2. https://www.whatisbiotechnology.org/index.php/science/summary/rdna**.**
3. https://www.open.edu/openlearn/science-maths-technology/science/biology/gene-manipulation-plants/content-section-0**.**
4. www.icgeb.org/wp-content/uploads/2019/02/3-Advances-in-the-Development-of-Genetically-Modified-Animals
5. https://www2.le.ac.uk/projects/vgec/highereducation/topics/recombinanttechniques**.**

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Restriction enzymes & homopolymer tailing. | 3 | Content-Focused method | LCD projector |
| 1.2 | Random shear & complementary DNA | 2 | Content-Focused method | LCD projector |
| 1.3 | Cloning vectors &Expression vectors, | 2 | Teacher-Centered method | LCD projector |
| 1.4 | Shuttle Vectors – pBR 322, pUC18, M13 Filamentous phage | 2 | Content-Focused method | LCD projector |
| 1.5 | Cosmids, Plasmids, Yeast Vectors. | 1 | Learners- Centered method | LCD projector |
| 1.6 | Ligation of sticky ends, blunt end ligation, | 1 | Teacher-Centered method | LCD projector |
| 1.7 | Techniques involved in transfer of genes in E coli, yeast cell, | 2 | Interactive- Method | LCD projector |
| 1.8 | Plant cell, mammalian cell and embryo. | 2 | Interactive- Method | LCD projector |
| UNIT – II [15 Hrs] |
| 2.1 | Gene markers, Plus and Minus Screening. | 3 | Content-Focused method | LCD projector |
| 2.2 | Immunochemical methods, hybridization methods. | 2 | Content-Focused method | LCD projector |
| 2.3 | Identification of translation product of a cloned gene | 2 | Teacher- Centered method | LCD projector |
| 2.4 | Hybrid released translation (HRT) | 2 | Content-Focused method | LCD projector |
| 2.5 | and Hybrid arrest translation (HART) techniques, | 3 | Learners- Centered method | LCD projector |
| 2.6 | Optimizing and Maximizing the expression of cloned genes. | 3 | Teacher- Centered method | LCD projector |
| UNIT – III [15 Hrs] |
| 3.1 | Transgenic plants. | 2 | Content-Focused method | LCD projector |
| 3.2 | Gene transfer through Agrobacterium tumefaciens | 3 | Content-Focused method | LCD projector |
| 3.3 | Herbicide resistant plants | 2 | Teacher- Centered method | LCD projector |
| 3.4 | virus resistant plants, | 3 | Content-Focused method | LCD projector |
| 3.5 | pest resistant plants, | 3 | Learners- Centered method | LCD projector |
| 3.6 | Delaying of fruit ripening | 2 | Learners - Centered method | LCD projector |
| UNIT – IV [15 Hrs] |
| 4.1 | Transgenic animals | 3 | Content-Focused method | LCD projector |
| 4.2 | Transgenic animals - methods | 1 | Teacher -Focused method | LCD projector |
| 4.3 | gene therapy | 3 | Teacher- Centered method | LCD projector |
| 4.4 | Homologous recombination | 3 | Content-Focused method | LCD projector |
| 4.5 | Allele replacement | 2 | Learners- Centered method | LCD projector |
| 4.6 | gene knock out | 3 | Teacher- Centered method | LCD projector |
|  | UNIT – V [15 Hrs] |  |
| 5.1 | Recombinant DNA Technology | 3 | Content-Focused method | LCD projector |
| 5.2 | DNA micro array | 3 | Content-Focused method | LCD projector |
| 5.3 | DNA finger printing –, RFLP &RAPD, | 3 | Teacher- Centered method | LCD projector |
| 5.4 | DGGE and Drug design | 2 | Content-Focused method | LCD projector |
| 5.5 | PCR, RTPCR | 2 | Learners- Centered method | LCD projector |
| 5.6 | Human Genome project. | 2 | Learners - Centered method | LCD projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 2 | 3 | 3 | 1 | 3 |
| **CO2** | 3 | 1 | 3 | 3 | 2 |
| **CO3** | 3 | 2 | 3 | 3 | 3 |
| **CO4** | 2 | 3 | 1 | 3 | 2 |
| **CO5** | 3 | 1 | 3 | 3 | 1 |

3-Strong 2 –Medium 1-Low

**COURSE DESIGNER: Dr.P.RAMESHKUMAR**

**ElectiveMajor DAIRY BIOCHEMISTRY Code: 212804305**

 **SEMESTER III 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To understand Principles of Milk Properties and Processes and new technologies that is used to diary technology.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Acquire knowledge about structure of milk, factors affecting composition of milk, Nomenclature and classification of milk proteins. | Up to K5 |
| **CO2** | Students will know the Biophysical and biochemical Properties of Milk | Up to K5 |
| **CO3** | Students will acquire knowledge in Significance of specific groups of microorganisms in milk | Up to K5 |
| **CO4** | Students will have exposure in Chemical composition and legal standards of milk products | Up to K5 |
| **CO5** | Students will acquire knowledge in the Emerging Dairy Processing Technologies | Up to K5 |

K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

**Biochemical Properties of Milk** -Definition and structure of milk, factors affecting composition of milk, Nomenclature and classification of milk proteins, Casein: physico-chemical properties of casein, Whey proteins: α-Lactalbumin and β-Lactoglobuline. Properties of α-Lactalbumin and β-lactoglobulin, Immmunoglobulin and other minor milk proteins and non-proteins nitrogen constituents of milk.

UNIT – II: **[15 Hrs]**

**Biophysical Properties of Milk** - Colloidal State: properties of colloidal system- Milk as a colloidal system and its stability & emulsion. Density- Density and specific gravity, pyknometer method, hydrometer lactometer. Density and specific gravity of milk, effect of various processing variables on the density and specific gravity of milk. Liquid State: Surface tension of mixtures. Surface tension of milk. Viscosity-. Viscosity of milk evaporated milk and condensed milk. Freezing point and boiling point of milk.

UNIT – III: **[15 Hrs]**

**Dairy Microbes** - Microbes associated with raw milk: Significance of specific groups of microorganisms in milk i.e. psychrotrophic, mesophilic, thermoduric and thermophillic bacteria, Microbial contaminants in raw milk- milking, chilling, storage and transportation. Microbial spoilage - souring, curdling, bitty cream, proteolysis, lipolysis.

UNIT – IV: **[15 Hrs]**

**Chemistry of Dairy Products** - Chemical composition and legal standards of milk products. Physico-chemical changes in milk constituents during manufacture and storage of traditional dairy products: Khoa, Paneer, Dahi, Ghee & Channa. Chemistry of cheese: milk clotting enzymes, enzymatic coagulation of milk, biochemical changes during ripening. Physico-chemical changes during processing and storage of ice cream and frozen desserts.

UNIT – V: **[15 Hrs]**

**Emerging Dairy Processing Technologies**- High Pressure Processing, Pulsed electric fields processing, osmotic membrane distillation, direct osmosis, Ultrasound processing, Ohmic heating & Microwave heating.

**TEXT BOOKS:**

1. Dairy technology: Principles of Milk Properties and Processes. Part III: Мilк Products, Walstra Р., Geurts Т.J., Noomen А., Jellema А., Van Boekel М.А.J.S. New Уогк: Marcel Dekker, Inc., 1999.
2. Handbook of Milk Composition, Robert G. Jensen, Marvin P. Thompson, Categories:, 1995, ISBN 13: 9780080533117.
3. Milk and Dairy Products in Human Nutrition: Production, Composition and Health, Wiley-Blackwell, 2013.

**REFERENCES:**

1. Dairy Technology-Principles of Milk Properties and Processes by P. Walstra, CRC Press, 1999.
2. The Technology of Dairy Products, Ralph Early, Springer Science & Business Media, 1998.

**WEB RESOURCES:**

1. https://dairyprocessinghandbook.tetrapak.com
2. https://z-lib.org
3. http://edepot.wur.nl
4. https://www.uoguelph.ca

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Biochemical Properties of Milk - Definition and structure of milk, | 2 | Content-Focused method | LCD projector |
| 1.2 | factors affecting composition of milk | 2 | Content-Focused method | LCD projector |
| 1.3 | Nomenclature and classification of milk proteins, | 2 | Teacher- Centered method | LCD projector |
| 1.4 | Casein: physico-chemical properties of casein, | 2 | Content-Focused method | LCD projector |
| 1.5 | Whey proteins: α-Lactalbumin and β-Lactoglobuline. | 1 | Learners- Centered method | LCD projector |
| 1.6 | Properties of α-Lactalbumin and β-lactoglobulin, | 2 | Teacher- Centered method | LCD projector |
| 1.7 | Immunoglobulin and other minor milk proteins and | 2 | Interactive- Method | LCD projector |
| 1.8 | Non-proteins nitrogen constituents of milk. | 2 | Interactive- Method | LCD projector |
| UNIT – II [15 Hrs] |
| 2.1 | Biophysical Properties of Milk–Colloidal State: properties of 2colloidal system | 2 | Content-Focused method | LCD projector |
| 2.2 | Milk as a colloidal system and its stability & emulsion. | 2 | Content-Focused method | LCD projector |
| 2.3 | Density- Density and specific gravity, pyknometer method, hydrometer lactometer. | 2 | Teacher- Centered method | LCD projector |
| 2.4 | Density and specific gravity of milk, effect of various processing variables on the density and specific gravity of milk. | 3 | Content-Focused method | LCD projector |
| 2.5 | Liquid State: Surface tension of mixtures. Surface tension of milk. | 3 | Learners- Centered method | LCD projector |
| 2.6 | Viscosity-. Viscosity of milk evaporated milk and condensed milk. Freezing point and boiling point of milk. | 3 | Teacher- Centered method | LCD projector |

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| UNIT – III [15 Hrs] |
| 3.1 | Dairy Microbes - Microbes associated with raw milk: | 3 | Content-Focused method | LCD projector |
| 3.2 | Significance of specific groups of microorganisms in milk i.e. psychrotrophic, mesophilic, | 3 | Content-Focused method | LCD projector |
| 3.3 | Thermoduric and thermophillic bacteria, Microbial contaminants in raw milk- milking, | 3 | Teacher- Centered method | LCD projector |
| 3.4 | Chilling & storage and transportation. | 2 | Content-Focused method | LCD projector |
| 3.5 | Microbial spoilage - souring, curdling, | 2 | Learners- Centered method | LCD projector |
| 3.6 | Bitty cream, proteolysis, lipolysis. | 2 | Learners - Centered method | LCD projector |
| UNIT – IV [15 Hrs] |
| 4.1 | Chemistry of Dairy Products - Chemical composition and legal standards of milk products. | 3 | Content-Focused method | LCD projector |
| 4.2 | Physico-chemical changes in milk constituents during manufacture and storage of traditional dairy products: | 3 | Teacher -Focused method | LCD projector |
| 4.3 | Khoa, Paneer, Dahi, Ghee & Channa. | 3 | Teacher- Centered method | LCD projector |
| 4.4 | Chemistry of cheese: milk clotting enzymes, enzymatic coagulation of milk. | 3 | Content-Focused method | LCD projector |
| 4.5 | Biochemical changes during ripening. | 1 | Learners- Centered method | LCD projector |
| 4.6 | Physico-chemical changes during processing and storage of ice cream and frozen desserts. | 2 | Teacher- Centered method | LCD projector |
| UNIT – V [15 Hrs] |
| 5.1 | Emerging Dairy Processing Technologies | 3 | Content-Focused method | LCD projector |
| 5.2 | High Pressure Processing, Pulsed electric fields | 3 | Content-Focused method | LCD projector |
| 5.3 | Processing, osmotic membrane distillation, | 3 | Teacher- Centered method | LCD projector |
| 5.4 | Direct osmosis, Ultrasound processing | 2 | Content-Focused method | LCD projector |
| 5.5 | Ohmic heating | 2 | Learners- Centered method | LCD projector |
| 5.6 | Microwave heating. | 2 | Learners - Centered method | LCD projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 1 | 3 | 2 | 1 | 3 |
| **CO2** | 3 | 1 | 2 | 2 | 2 |
| **CO3** | 1 | 2 | 3 | 3 | 3 |
| **CO4** | 2 | 3 | 1 | 1 | 2 |
| **CO5** | 1 | 1 | 2 | 3 | 1 |

3-Strong; 2 –Medium; 1-Low

**COURSE DESIGNER: Dr.P.RAMESHKUMAR**

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**Core Lab LAB IN ADVANCED BIOCHEMISTRY Code: 172804306**

 **SEMESTER III 10 Hrs/Week**

 **Credits 6**

***PREAMBLE:***

* ***To give maximum exposure to the latest techniques with basics at core.***
1. Western Blotting Technique.
2. Partial Restriction mapping of pBR 322.
3. Cloning of DNA fragment into pUC 18 and selection of recombinant.
4. PCR technique.
5. Induction and measurement of β-Galactosidase Activity
6. Antibody titre – Quantitative Precipitin Assay, Haemagglutination.

**REFERENCES:**

1. Chellam Rajamanickam, An Experimental Manual in Molecular Biology.2005.
2. Gunesekaran P., Lab Manual in Microbiology. 1996.
3. Ninfa, Fundamental laboratory approaches for Biochemistry and Biotechnology. 1998.

**WEB RESOURCES:**

1. https://www.bosterbio.com/protocol-and-troubleshooting/western-blot-principle**.**
2. https://www.future-science.com/doi/10.2144/btn-2019-0014
3. https://www.yourgenome.org/facts+&cd=14&hl=en&ct=clnk&gl=in
4. https://openwetware.org/wiki/BetaGalactosidase\_Assay\_(A\_better\_Miller)
5. https://www.labome.com/method/Antibody-Dilution-and-Antibody-Titer.html

**PEDOGOGY:** Chalk@talk, Powerpoint presentation, learning and doing

**COURSE DESIGNER: Dr.P.RAMESHKUMAR**

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**Self-Learning Course GENOMICS Code:218004328**

 **SEMESTER III Addl. Credits 3**

***PREAMBLE:***

* ***To understand the genetic material of an organism, that is, the total amount of DNA in the cell and about genome sequences at the molecular level.***

UNIT – I:

 **Introduction:** Introduction – Definition, Scope and Importance of genomics. Tools of genome analysis MALDI-MS, MALDI-TOF-MS, Application of MS for genome analysis, DNA chip technology and micro arrays.

UNIT – II:

 **Techniques:** Genomic DNA isolation, Plasmid DNA isolation, Restriction mapping, cDNA Libraries, Cloning – Protocol only, RAPD, RFLP, PCR, Hybridization techniques – Southern, Western, Northern.

UNIT – III:

 **Animal and Human Genomics:** Scope, introduction to animal culture, stem cell lines – Definition, function, Origin, Decision, Types, Application – Therapeutics, stem cell therapy and human genome project.

UNIT – IV:

 **Plant Genomics:** Preparation of genetic maps – Molecular cytogenetic map, molecular mapping in yeast and other fungus, comparative genomics and collinearity/synteny in maps, Arabidopsis thaliana genome, Rice genome, Maize genome, functional genomes in plants.

UNIT – V:

 **Drug Discovery and Drug Design:** Molecular drugs, microbial genome for new antibiotics, Pharmacogenomics – Immunotoxin as drug. Drug design – By blocking by hormone receptor, Nucleic acid synthesis, blocking enzyme activity and heterogenous targets.

**TEXT BOOK:**

1. Gupta R.K., Biotechnology and Genomics, Rastogi Publication, India, 2004.
2. Richard C.Deonier Simon Tavare Michale S.Waterman,Computational Genome Analysis,Springer,2005
3. Gudio Grandi Genomics proteomics and Vaccines,John Wiley and sons Ltd,2004.

**REFERENCES:**

1. Irfan Ali Khan Atiya Khanum, Fundamentals of Gene, Genomics and Genetic Engineering, 1st Edition,2004. Ukaaz Publications, Shalivahana Nagar, Moorsarambagh, Hyderabad – 6.
2. Ernst.L.Winnacker,From Genes to clones.Panima Educational Book Agency,1987.
3. 03. Bruce.S.Weir, Genetic Data Analysis-II,Sinauer Associates,Inc.Publishers,1986.

**WEB RESOURCES:**

1. https://molbiol-tools.ca/Genomics.htm**.**
2. https://www2.le.ac.uk/projects/vgec/highereducation/topics/recombinanttechniques**.**
3. https://www.cliffsnotes.com/studyguides/biology/microbiology/dna-and-gene-expression/recombinant-dna-and-biotechnology
4. https://www.genome.gov/about-genomics/fact-sheets/Comparative-Genomics-Fact-Sheet**.**

**COURSE DESIGNER: Dr.P.RAMESHKUMAR**

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**Core Subject EUKARYOTIC GENE EXPRESSION Code: 212804401**

 **SEMESTER IV 5 Hrs/Week**

 **Credits 5**

***PREAMBLE:***

* ***To understand the mechanism of our complex biological processes coordinating the control of gene expression with respect to cell signaling.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Understand the molecular organization of genes and chromosomes | Up to K5 |
| **CO2** | Learn the process of DNA replication in eukaryotes | Up to K5 |
| **CO3** | Learn about the cell cycle and its regulation. | Up to K5 |
| **CO4** | Understand the process of transcription in eukaryotes and its modification. | Up to K5 |
| **CO5** | Study the mechanism of protein synthesis in eukaryotes and its modification, protein targeting and folding. | Up to K5 |

K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I:  **[15 Hrs]**

 **Eukaryotic gene Structure:** Molecular definition of a gene, Gene families, pseudogenes, Tandemly repeated genes, Cot curve analysis – complexity and frequency of repetition, Morphology and functional characteristics of Eukaryotic chromosomes.

UNIT – II: **[15 Hrs]**

 **Eukaryotic gene replication,** ARS, SV4O – replication origin, Role of topoisomerases in DNA replication, Role of histones, various enzymes machinery of DNA replication in eukaryotes.

UNIT – III:  **[15 Hrs]**

 **Cell cycle and regulation**- Mitosis, Meiosis - S, M phases, Role of cdk, control at G1/S transition.

UNIT – IV: **[15 Hrs]** **Eukaryotic Transcription**– promoters – regulatory elements, enhancers, activators – trans acting proteins, RNA polymearse, Transcription factors, processing – capping, splicing, editing, Role of poly adenylation .

UNIT – V: **[15 Hrs]**

 **Eukaryotic Translation -** genetic code – eukaryotic ribosomes, rRNA & tRNA - translational apparatus – polysomes –mRNA export -translational modification – secretory protein signal hypothesis – glycosylation, protein targeting & protein folding.

**TEXT BOOKS:**

1. Benjamin Lewin, Genes IX, Oxford University Press, Oxford, London, 2008.
2. Harvey Lodish, David Baltimore, Molecular Biology, Scientific American Books, New York, fifth Edition 2004.

**REFERENCES:**

1. Watson J.D., Hopkins, Roberts, Molecular Biology of the Gene, Benjamin / Cummings Publishing Company, Inc. California, 4th Edition 1987.
2. William S.Klug Michael R. Cummings ,Genetics, sixth edition, Published by Prentice Hall ,Inc,1997.
3. Richard P. Oliver and Michael Schweizer ,Molecular,fungal biology,Cambridge university,1999.
4. 03. Roger L P.Adams,John T. Knowler, and David P.leader, The biochemistry of Nucleic acids, Chapman and Hall, London ,Eleventh edition,1993.

**WEB RESOURCES:**.

1. www.cliffsnotes.com › study-guides › biology › biochemistry-ii › eukar...[bio.libretexts.org › Bookshelves 14:\_DNA\_Structure\_and\_Function](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=2ahUKEwiTn8T__dfnAhXBR30KHdDODgMQFjACegQIDhAH&url=https%3A%2F%2Fbio.libretexts.org%2FBookshelves%2FIntroductory_and_General_Biology%2FBook%253A_General_Biology_(Boundless)%2F14%253A_DNA_Structure_and_Function%2F14.3%253A_DNA_Replication%2F14.3C%253A_DNA_Replication_in_Eukaryotes&usg=AOvVaw019zGUU7Af-s1iY8LyARVB) [courses.lumenlearning.com › biology1 › chapter › control-of-the-cell-cycle](https://courses.lumenlearning.com/biology1/chapter/control-of-the-cell-cycle/)
2. www.khanacademy.org › science › biology › stem-cells-and-cancer [en.wikipedia.org › wiki › Eukaryotic\_transcription](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&ved=2ahUKEwjntt6i_9fnAhXRyjgGHSCoCbYQFjAHegQIDBAG&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FEukaryotic_transcription&usg=AOvVaw18cRH7SDwd81UYdSJjB210) [[en.wikipedia.org › wiki › Eukaryotic\_translation](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=8&ved=2ahUKEwjntt6i_9fnAhXRyjgGHSCoCbYQFjAHegQIDBAG&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FEukaryotic_transcription&usg=AOvVaw18cRH7SDwd81UYdSJjB210)](https://en.wikipedia.org/wiki/Eukaryotic_translation) [en.wikipedia.org › wiki › Post-translational\_modification](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=2ahUKEwil64rc_9fnAhVfwzgGHbeWAaQQFjACegQIDBAG&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FPost-translational_modification&usg=AOvVaw0mHxO4CHtRDewgzrf1Z1I7)

 **COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Introduction about Eukaryotic gene Expression | 1 | Teacher –Centered Method | Black Board |
| 1.2 | Molecular definition of a gene | 1 | Teacher –Centered Method | Black Board |
| 1.3 | Gene families | 2 | Teacher –Centered Method | Black Board |
| 1.4 | Tandemly repeated genes | 1 | Teacher –Centered Method | Black Board |
| 1.5 | pseudogenes, | 2 | Teacher –Centered Method | Black Board |
| 1.6 | Cot curve analysis – complexity and frequency of repetition | 4 | Teacher –Centered Method | Black Board |
| 1.7 | Morphology and functional characteristics of Eukaryotic chromosomes. | 4 | Teacher –Centered Method | Black Board |
| UNIT – II [15 Hrs] |
| 2.1 | Introduction about Eukaryotic gene replication. | 1 | Teacher –Centered Method | Black Board |
| 2.2 | Autonomously Replicating sequence - ARS | 1 | Teacher –Centered Method | Black Board |
| 2.3 | SV4O – replication origin, Initiation , Elongation and Termination | 4 | Teacher –Centered Method | Black Board |
| 2.4 | Role of topoisomerases in DNA replication | 3 | Teacher –Centered Method | Black Board |
| 2.5 | Role of histones | 2 | Teacher –Centered Method | Black Board |
| 2.6 | Various enzymes machinery of DNA replication in eukaryotes. | 4 | Teacher –Centered Method | Black Board |
| UNIT – III [15 Hrs] |
| 3.1 | Introduction about Cell cycle and regulation. | 1 | Teacher –Centered Method | Black Board |
| 3.2 | Interphase | 1 | Teacher –Centered Method | Black Board |
| 3.3 | Mitosis | 1 | Content-Focused method | OHP Sheet |
| 3.4 | Meiosis | 1 | Content-Focused method | OHP sheet |
| 3.5 | Role of Cyclin cdk complex | 3 | Teacher –Centered Method | Black Board |
| 3.6 | Regulation of S phase | 3 | Teacher –Centered Method | Black Board |
| 3.7 | Regulation of M phase | 3 | Content-Focused method | LCD Projector |
| 3.8 | Control at G1/S transition | 2 | Content-Focused method | LCD Projector |
| UNIT – IV [15 Hrs] |
| 4.1 | Introduction about Eukaryotic Transcription. | 1 | Teacher –Centered Method | Black Board |
| 4.2 | Promoters – regulatory elements, | 2 | Content-Focused method | LCD Projector |
| 4.3 | Enhancers | 2 | Content-Focused method | LCD Projector |
| 4.4 | Activators – trans acting proteins, | 1 | Content-Focused method | LCD Projector |
| 4.5 | RNA polymerase, Transcription factors, | 2 | Teacher –Centered Method | Black Board |
| 4.6 | Mechanism of Transcription – Initiation, elongation and Termination. | 3 | Content-Focused method | LCD Projector |
| 4.6 | Processing – capping, splicing, editing, | 2 | Content-Focused method | OHP Sheet |
| 4.7 | Role of poly adenylation. | 2 | Teacher –Centered Method | Black Board |
| UNIT – V [15 Hrs] |
| 5.1 | Introduction about Eukaryotic Translation. | 1 | Teacher –Centered Method | Black Board |
| 5.2 | Genetic code | 1 | Content-Focused method | LCD Projector |
| 5.3 | Eukaryotic ribosomes, rRNA & tRNA | 1 | Content-Focused method | LCD Projector |
| 5.4 | Mechanism of Translation | 2 | Content-Focused method | LCD Projector |
| 5.5 | Translational apparatus | 1 | Content-Focused method | LCD Projector |

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| 5.6 | Polysomes –mRNA export | 2 | Content-Focused method | LCD Projector |
| 5.7 | Translational modification | 2 | Content-Focused method | LCD Projector |
| 5.8 | Secretory protein signal hypothesis- glycosylation | 2 | Content-Focused method | LCD Projector |
| 5.9 | Protein targeting & protein folding. | 3 | Content-Focused method | LCD Projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 2 | 3 | 3 | 2 | 3 |
| **CO2** | 2 | 3 | 3 | 2 | 2 |
| **CO3** | 2 | 3 | 2 | 2 | 2 |
| **CO4** | 2 | 3 | 3 | 1 | 2 |
| **CO5** | 3 | 3 | 3 | 2 | 2 |

3 – Strong; 2 –Medium; 1 – Low;

**COURSE DESIGNER: Miss M.GLORY JASMINE RANI**

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**Core Subject ENDOCRINOLOGY AND NEUROCHEMISTRY**

 **SEMESTER IV Code: 212804402**

**5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To understand endocrine biochemistry hormone actions, hormone interactions, endocrine physiology and pathophysiology of endocrine diseases.***
* ***To understand intricate connections among neural systems and complex interactions between individuals.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

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| --- | --- | --- |
| **No.** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Understand endocrine biochemistry hormone actions, hormone interactions, endocrine physiology and pathophysiology of endocrine diseases. | Up to K5 |
| **CO2** | Develop skills to Biochemistry of hormones | Up to K5 |
| **CO3** | Gain insight into Growth factors | Up to K5 |
| **CO4** | Become aware with the Nerve Impulse transmission and Neurotransmitters | Up to K5 |
| **CO5** | Understanding the importance of Disorders of neurotransmission | Up to K5 |

 K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **Characteristics of hormone systems** – Functions and Mechanism of action of hormones – hormones and Behavior – secondary messengers and signal transduction.

UNIT – II: **[15 Hrs]**

 **Biochemistry of hormones:** Chemistry, Biosynthesis, Secretion, Biochemical actions of pituitary, Thyroid, Parathyroid, Adrenal and gonadal hormones, GI tract hormones.

UNIT – III:  **[15 Hrs] Growthfactors:** Somatomedin, and Erythropoietin, Nerve growth factor, epidermal growth factor, fibroblast growth factor –Chemistry and Biochemical action.

UNIT – IV: **[15 Hrs]**

 **General Design of CNS** – Major level of CNS function – Synapse – Types – Anatomy – Chemical transmitters – Acetyl Choline, Seratonine and Dopamine - Neurotoxins. Nerve Impulse transmission – excitation – Inhibition.

UNIT – V:  **[15 Hrs]**

 **Disordersof neurotransmission** – cholinergic systems (Alzheimer’s disease) adrenergic system – Parkinson’s disease, Schizophrenia, epilepsy, Huntington disease, Multiple sclerosis.

**TEXT BOOKS:**

* 1. Guyton Hall Coth, Human Physiology, Harcourt Publishers, International Company11th Edition,2006. Singapore.
	2. Mac. Hadley, Endocrinology, Printice Hall, International Inc, Washington, D C.2006.
	3. Robert Polmin,John C.De Fries,Gerald E. McClearn,Michael Rutter, Behavioral Genetics,thrid edition,W.H.Freeman Company and New York,1997.

**REFERENCES:**

1. Lubert Stryer, Biochemistry, 7th Edition, 2012. W.H. Freeman and Company, New York.
2. Thomas M.Devlin,Text Book of Biochemistry, Fourth edition,A John Wiley and sons, Inc., Publications, 1997.
3. 03. Carl A Burtis, TETZ Text Book of Clinical Chemistry, Harcourt Brace & Company Asia Pvt Ltd, third edition, 1999.

**WEB RESOURCES:**

1. http://www2.csudh.edu/nsturm/CHE452/15\_Over.%20Biochem.%20Endo.htm**.**
2. https://biochem.zsmu.zp.ua/wp-content/uploads/2017/04/Biochemistry-of-hormones.pdf
3. https://www.prospecbio.com/growth\_factors**.**
4. https://www.universalclass.com/articles/health/understanding-the-role-of-hormones-and-neurotransmitters-in-mental-and-emotional-health.htm

 **COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Introduction | 2 | Content-Focused method | LCD Projector |
| 1.2 | Characteristics of hormone systems | 2 | Teacher- Centered method | LCD Projector |
| 1.3 | Functions of hormones | 2 | Content-Focused method | LCD Projector |
| 1.4 | Peptide hormones | 2 | Learners- Centered method | LCD Projector |
| 1.5 | Steroid hormones | 2 | Teacher- Centered method | LCD Projector |
| 1.6 | Other hormones | 2 | Content-Focused method | LCD Projector |
| 1.7 | Mechanism of action of hormones | 1 | Teacher- Centered method | LCD Projector |
| 1.8 | Hormones and Behavior- secondary messengers and signal transduction. | 2 | Content-Focused method | LCD Projector |
| UNIT – II [15 Hrs] |
| 2.1 | Biochemistry of hormones | 1 | Content-Focused method | LCD Projector |
| 2.2 | Chemistry, Biosynthesis, Secretion, Biochemical actions of pituitary. | 3 | Teacher- Centered method | LCD Projector |
| 2.3 | Chemistry, Biosynthesis, Secretion, Biochemical actions of Thyroid | 3 | Content-Focused method | LCD Projector |
| 2.4 | Chemistry, Biosynthesis, Secretion, Biochemical actions ofParathyroid | 3 | Learners- Centered method | LCD Projector |
| 2.5 | Chemistry, Biosynthesis, Secretion, Biochemical actions ofAdrenal and gonadal hormones | 3 | Teacher- Centered method | LCD Projector |
| 2.6 | Chemistry, Biosynthesis, Secretion, Biochemical actions ofGI tract hormones | 2 | Content-Focused method | LCD Projector |
| UNIT – III [15 Hrs] |
| 3.1 | Growthfactors | 1 | Content-Focused method | LCD Projector |
| 3.2 | Chemistry, Biosynthesis, Secretion, Biochemical actions of Somatomedin | 3 | Teacher- Centered method | LCD Projector |
| 3.3 | Chemistry, Biosynthesis, Secretion, Biochemical actions of epidermal growth factor | 3 | Content-Focused method | LCD Projector |
| 3.4 | Chemistry, Biosynthesis, Secretion, Biochemical actions of Nerve growth factor | 3 | Learners- Centered method | LCD Projector |
| 3.5 | Chemistry, Biosynthesis, Secretion, Biochemical actions of fibroblast growth factor | 3 | Teacher- Centered method | LCD Projector |
| 3.6 | Chemistry, Biosynthesis, Secretion, Biochemical actions of Erythropoietin | 2 | Content-Focused method | LCD Projector |
| UNIT – IV [15 Hrs] |
| 4.1 | General Design of CNS | 3 | Content-Focused method | LCD Projector |

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| 4.2 | –Major level of CNS function | 3 | Teacher- Centered method | LCD Projector |
| 4.3 | Synapse – Types – Anatomy – Chemical transmitters | 3 | Content-Focused method | LCD Projector |
| 4.4 | Acetyl Choline, Seratonine and Dopamine - Neurotoxins. | 3 | Learners- Centered method | LCD Projector |
| 4.5 | Nerve Impulse transmission – excitation – Inhibition. | 3 | Teacher- Centered method | LCD Projector |
| UNIT – V [15 Hrs] |
| 5.1 | Disorders of neurotransmission | 2 | Content-Focused method | LCD Projector |
| 5.2 | Cholinergic systems (Alzheimer’s disease). | 3 | Teacher- Centered method | LCD Projector |
| 5.3 | adrenergic system – Parkinson’s disease, | 3 | Content-Focused method | LCD Projector |
| 5.4 | Schizophrenia, epilepsy | 3 | Learners- Centered method | LCD Projector |
| 5.5 | Huntington disease, | 3 | Teacher- Centered method | LCD Projector |
| 5.6 | Multiple sclerosis | 1 | Content-Focused method | LCD Projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 2 | 1 | 2 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 1 |
| **CO3** | 3 | 2 | 3 | 3 | 3 |
| **CO4** | 2 | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 1 | 1 | 3 | 1 |

3-Strong; 2 –Medium; 1-Low

**COURSE DESIGNER: Dr.P.RAMESHKUMAR**

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**Core Subject PLANT BIOCHEMISTRY Code: 172804403**

 **SEMESTER IV 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To provide a broad explanations of the physiology of plants (their functions) from seed germination to vegetative growth, maturation and flowering.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No.** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Obtain knowledge about the micro and macronutrients, nitrogen fixation and sulfate accumulation in plants and know how plants survive under stress condition(water, temperature and salt) and climate change | Up to K5 |
| **CO2** | Acquire knowledge about mechanisms of photosynthesis in plants | Up to K5 |
| **CO3** | Know about phytohormones and its application in agriculture and secondary metabolites in plants. | Up to K5 |
| **CO4** | Understanding the mechanisms of plant pathogenesis and disease resistance mechanism in plants. | Up to K5 |
| **CO5** | Understanding the various physiological processes in plants and component of culture media and various plant tissue culture techniques | Up to K5 |

K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **Plant Nutrition** – Essential nutrients – inorganic nutrients, their functions, deficient and toxicity symptoms Nitrogen fixation. Biochemistry of nitrate assimilation sulphur metabolism, sulfate activation and sulfate assimilation.

**The physiology of plant under stress** – Water, Temperature and Salt stress.

UNIT –II: **[15 Hrs]**

 **Photosynthesis**: Structure and composition of photosynthetic apparatus, photosynthetic pigments, Light and Dark reactions of photosynthesis, carbondioxide fixation - C3, C4 and CAM pathways. Biosynthesis of sucrose and starch, factors affecting the rate of photosynthesis, photorespiration.

UNIT – III: **[15 Hrs]**

 **Growth Regulators:** Auxins, Gibberellins, cytokinin, ABA, Ethylene – Metabolism and Function.

 **Phytochemistry**: Storage carbohydrates, proteins, fats. Secondary plant products – Waxes, essential oils, phenol, flavones, flavanols, anthocyanins.

UNIT – IV: **[15 Hrs]**

 **Biochemistry of plant diseases**– Plant pathogenesis. Initial stages of pathogenesis, mechanisms of pathogenesis – Mechanisms of attack.

 **Responses of plants to pathogens** – Pathological effects of respiration, photosynthesis, cell wall enymes and water uptake. **Disease resistance mechanism** - phytoalexins.

UNIT – V: **[15 Hrs]**

 **Photomorphogenesis:** Photoperiodism – phytochrome, physiology and Biochemistry of senescence, Biochemistry of seed germination, seed dormancy.

 **Plant tissue Culture:** Explant, Requirements for INVITRO Cultures, Nutrient media Composition and Preparation. Methods of Plant tissue Culture – Organogenesis, Micropropagation, Cell culture, Somatic Embryogenesis. Somoclonal Variation, Protoplast Culture, Somatic Hybridization, Pollen culture, Embryo Culture, Applications of plant tissue culture.

**TEXT BOOKS:**

1. Hans Walter, plant biochemistry and Molecular biology Oxford University Press, London.1999.
2. Hopkins, Plant Physiology, 2nd Edition,1999. John Wiley and Sons, Inc, New York.
3. Peter J.Lea Richard C. Leegood, Plant Biochemistry & Moleculart biology, Second edition , John Willey & Sons Ltd., 1999

**REFERENCES:**

1. Frank Salisbury B., Cleon W.Ross, Plant Physiology, 4th Editions,1995. Wads Worth Publishing Company, Belmont, California.
2. Goodwin and Mercer, plant bio chemistry, 2nd Edition,2003. cdf publishers, New Delhi.
3. S.K.Varma, A text book of plant physiology & Biochemistry, S.Chand 2006.
4. 04.P.S.Srivastava, Plant Tissue & Molecular Biology, N.K. Mehara for Narosa Publishing house, 1998.

**WEB RESOURCES:**

1. http://www.biology4kids.com/files/plants%20photosynthesis.html
2. https://www.britannica.com/
3. https://www.slideshare.net/prakashsiju/chapter-3-plant-tissue-culture

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Introduction to Plant Nutrition | 1 | Teacher – Centered method | Black Board |
| 1.2 | Essential nutrients | 1 | Teacher – Centered method | Black Board |
| 1.3 | Organic and inorganic nutrients | 3 | Teacher – Centered method | Black Board |
| 1.4 | Nitrogen fixation | 2 | Teacher – Centered method | Black Board |
| 1.5 | Nitrate assimilation | 2 | Teacher – Centered method | Black Board |
| 1.6 | Sulphur metabolism | 1 | Teacher – Centered method | Black Board |
| 1.7 | Sulfate activation | 1 | Teacher – Centered method | Black Board |
| 1.8 | Sulfate assimilation. | 2 | Teacher – Centered method | Black Board |
| 1.9 | physiology of plant under stress | 2 | Teacher – Centered method | Black Board |
| UNIT – II [15 Hrs] |
| 2.1 | Introduction to Photosynthesis | 2 | Content-Focused method | LCD projector |
| 2.2 | Light reactions of photosynthesis | 2 | Content-Focused method | LCD projector |
| 2.3 | Darkreactions of photosynthesis | 3 | Content-Focused method | LCD projector |
| 2.4 | C3, C4 and CAM pathways. | 4 | Content-Focused method | LCD projector |
| 2.5 | Factors affecting the rate of photosynthesis | 2 | Teacher – Centered method | Black Board |
| 2.6 | photorespiration | 2 | Teacher – Centered method | Black Board |
| UNIT – III [15 Hrs] |
| 3.1 | Growth Regulators- Auxins, Gibberellins, | 4 | Teacher – Centered method | Black Board |
| 3.2 | Cytokinin, ABA, Ethylene | 3 | Teacher – Centered method | Black Board |
| 3.3 | Phytochemistry- Storage carbohydrates, proteins, fats. | 4 | Teacher – Centered method | Black Board |
| 3.4 | Secondary plant products | 4 | Teacher – Centered method | Black Board |
| UNIT – IV [15 Hrs] |
| 4.1 | Initial stages of pathogenesis | 4 | Content-Focused method | LCD projector |
| 4.2 | Mechanisms of pathogenesis | 3 | Content-Focused method | LCD projector |
| 4.3 | Pathological effects of respiration, photosynthesis | 4 | Content-Focused method | LCD projector |
| 4.4 | Disease resistance mechanism | 4 | Content-Focused method | LCD projector |
| UNIT – V [15 Hrs] |
| 5.1 | Photoperiodism | 2 | Teacher – Centered method | Black Board |
| 5.2 | Phytochrome | 1 | Teacher – Centered method | Black Board |
| 5.3 | Senescence | 2 | Teacher – Centered method | Black Board |
| 5.4 | Seed germination, seed dormancy. | 4 | Content-Focused method | LCD projector |
| 5.5 | Plant tissue Culture | 4 | Content-Focused method | LCD projector |
| 5.6 | Applications of plant tissue culture | 2 | Content-Focused method | LCD projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 2 |
| **CO2** | 3 | 3 | 2 | 3 | 2 |
| **CO3** | 2 | 3 | 1 | 3 | 2 |
| **CO4** | 1 | 1 | 1 | 2 | 1 |
| **CO5** | 3 | 3 | 3 | 3 | 3 |

3 – Strong; 2 – Medium; 1 – Low

**COURSE DESIGNER: Mrs N.VIJAYALAKSHMI**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**Elective Major ENVIRONMENTAL BIOCHEMISTRY Code: 212804404**

 **SEMESTER IV 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To determine the nature as well as quantity of specific pollutants in the environment and also to apply the genetic engineering methods and improved bioreactors for wastewater and Industrial waste treatement.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

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| **No.** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Provide knowledge about basic concepts about environmental pollutions such as land pollution, noise pollution and it’s effects | Up to K5 |
| **CO2** | Students will gain knowledge about the sources, biochemical effects and controlling measures solid waste, water pollution and marine pollution | Up to K5 |
| **CO3** | Students will acquire knowledge thermal pollution, general treatment of industrial effluents and removal of waste from various industries. | Up to K5 |
| **CO4** | Enrich the student’s knowledge about the harmful effects of pesticides and environmental risks of food colours and food additives | Up to K5 |
| **CO5** | Understanding the harmful effects of radiation and plastic pollution | Up to K5 |

 K1-Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **Pollution;** Types of pollution - Air Pollution – Sources – Effects on vegetation, animals and human, Effects on Biosphere- global warming and Acid rain; control methods. Land pollution – biochemical effects.Noise pollution – biochemical effects.

UNIT – II: **[15 Hrs]**

 **Solid waste –** characteristics of municipal waste: disposal; hazardous waste. Water pollution – Sources, effects of pollution on lakes and oceans. Marine pollution – pollutants, sources, effects, control methods.

UNIT – III: **[15 Hrs]**

 **Thermal pollution** – Sources, Effects and Prevention. Industrial pollution – sources, Characteristics, general treatment of industrial effluents. Removal of waste from various industries eg- tannery and pesticide. Instruments and methods for monitoring industrial pollutants.

UNIT – IV: **[15 Hrs]**

 **Pesticides –** Types – Structure, mode of action, degradation of pesticides by microorganisms – problems of pollution by pesticides. Environmental risks of direct and indirect food additives, food colours and other contaminants.

UNIT – V: **[15 Hrs]**

**Radiation Pollution**; Sources – Effects of radiation – disposal of radioactive waste, waste management. Plastics – Industrial and laboratory hazards of plastics and their decomposition products – environmental ethics.

**TEXT BOOKS:**

1. Sharma B.K., Environmental Chemistry, Goel Publishing House,Ist Edition,2005. Meerut.
2. R.K.Arora , Air Pollution, Mangal deep Publication,1999.
3. Botkin Keller, Environmental Science third edition, , John Willey & Sons inc., 2000.

**REFERENCES:**

1. Charles Krebs J., Ecology, 4th Edition, 1994, Addition Wesley Longman Inc, California
2. Eugene P.Odum, Fundamentals of Ecology, 3rd Edition, 2000. Natraj Publishers, Dehradun.
3. Grag K.L., Neelima garg, Mukaerji K.G., Recent advances in Bio Deterioration and Bio Degradation, Vol. II, Naya Prakash, Calcutta, India.1992.
4. Jerald L. Schnoor, Environmental Modelling, , John Willey & Sons Ltd., 1996.

**WEB RESOURCES:**

1. https://www.britannica.com
2. https://www.conserve.energy-future.com
3. https://www.livescience.com
4. https://www.environmentalpollutioncenters.org
5. https://plastic-pollution.org

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Types of pollution | 2 | Teacher – Centered method | Black Board |
| 1.2 | Air pollution-sources, impacts and control measures | 3 | Teacher – Centered method | Black Board |
| 1.3 | Global warming | 1 | Teacher – Centered method | Black Board |
| 1.4 | Land pollution- sources, impacts and control measures | 5 | Teacher – Centered method | Black Board |
| 1.5 | Noise pollution-sources, impacts and control measures | 4 | Teacher – Centered method | Black Board |
| UNIT – II [15 Hrs] |
| 2.1 | Characteristics of municipal wastes | 2 | Teacher – Centered method | Black Board |
| 2.2 | Soil pollution pollution-sources, impacts and control measures | 3 | Teacher – Centered method | Black Board |
| 2.3 | Hazardous waste | 2 | Teacher – Centered method | Black Board |
| 2.4 | Water pollution-sources, impacts and control measures | 4 | Teacher – Centered method | Black Board |
| 2.5 | Marine pollution-sources, impacts and control measures | 4 | Teacher – Centered method | Black Board |
| UNIT – III [15 Hrs] |
| 3.1 | Thermal pollution-introduction | 2 | Content-Focused method | LCD projector |
| 3.2 | Thermal pollution-sources, impacts and control measures | 4 | Content-Focused method | LCD projector |
| 3.3 | Characteristics of industrial effluents | 2 | Content-Focused method | LCD projector |
| 3.4 | Treatment of industrial effluents | 2 | Content-Focused method | LCD projector |
| 3.5 | Removal waste from tannery and pesticide industries | 3 | Content-Focused method | LCD projector |
| 3.6 | Instruments and methods for monitoring industrial pollutants | 2 | Content-Focused method | LCD projector |
| UNIT – IV [15 Hrs] |
| 4.1 | Types of pesticides | 2 | Content-Focused method | LCD projector |
| 4.2 | Pesticides -Mode of action | 2 | Content-Focused method | LCD projector |
| 4.3 | Pesticide pollution-sources, impacts and control measures | 4 | Content-Focused method | LCD projector |
| 4.4 | Direct and indirect Food additives | 4 | Content-Focused method | LCD projector |
| 4.5 | Food colours - Risks | 3 | Content-Focused method | LCD projector |
| UNIT – V [15 Hrs] |
| 5.1 | Radiation pollution introduction | 2 | Content-Focused method | LCD projector |
| 5.2 | Radiations- hazards | 3 | Content-Focused method | LCD projector |
| 5.3 | Radiation pollution-sources, impacts and control measures | 3 | Content-Focused method | LCD projector |
| 5.4 | Plastic pollution- introduction | 3 | Content-Focused method | LCD projector |
| 5.5 | Plastic pollution-sources, impacts and control measures - environmental ethics | 4 | Content-Focused method | LCD projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 3 | 3 | 3 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | 1 |
| **CO3** | 3 | 1 | 3 | 2 | 1 |
| **CO4** | 2 | 3 | 2 | 3 | 1 |
| **CO5** | 3 | 3 | 3 | 2 | 1 |

3-Strong 2 –Medium 1-Low

**Industrial visit:**

In order to get practical exposures, One day /two days Industrial visit to Institutions/ Factories/ Industry should be arranged in the 3rd or 4th semester.

**COURSE DESIGNER: Dr. R. ANITHA JOTHI**

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**Elective Major NUTRITIONAL BIOCHEMISTRY Code: 212804405**

 **SEMESTER IV 5 Hrs/Week**

 **Credits 4**

***PREAMBLE:***

* ***To understand the Nutritive values of Bio molecules, planning of balanced diets Food Adulteration, Future Foods and about preservation methods of foods.***

**COURSE OUTCOMES (COs)**

On Successful completion of the course, the students will be able to

|  |  |  |
| --- | --- | --- |
| **No** | **Course Outcome** | **Knowledge Level (According to Bloom’s Taxonomy)** |
| **CO1** | Understanding Describe the relationship between nutrition & Health. | Up to K5 |
| **CO2** | Obtain knowledge about sources, functions and deficiency symptoms of Micronutrients | Up to K5 |
| **CO3** | Learn about nutritional requirement of school children, adult, pregnant women and lactative mother. | Up to K5 |
| **CO4** | Gain e knowledge about food additives and its ill effects. | Up to K5 |
| **CO5** | Acquire knowledge about food preservation and future foods. | Up to K5 |

K1- Remember K2-Undestand K3-Apply K4-Analyse K5-Evaluate

UNIT – I: **[15 Hrs]**

 **Energy Metabolism:**Diet, Balanced diet, Classification of foods, calorific value of foods, nutritional requirements, RDA,ICMR Body Mass Index (BMI), Basal Metabolic Rate (BMR) – determination and factors affecting, biological value of proteins, energy value of fats, protein calorie deficiency (Kwashiorkor and Marasmus), malnutrition (under nutrition and over nutrition), Obesity, dietary guidelines for Indians.

UNIT – II: **[15 Hrs]**

 **Micronutrients:** water soluble and fat soluble vitamins- structure, sources, requirements, functions and deficiency symptoms. Macrominerals – calcium, phosphorus, magnesium, sodium, potassium, chloride. Micro Minerals – Iron, zinc, copper, selenium

UNIT – III: **[15 Hrs]**

 **Food groups and planning of balanced diets** – Classification of foods – Functional classification of food, 7 food group plan, 11 food group plan.

 Infant nutrition and infant food, modification of animal milk for infant feeding, processed infant foods, supplementary food.

 Nutrition of school children, adolescents, pregnant and lactating mothers. Effect of cooking and heat processing on the nutritive value of foods – Vitamins, Minerals, Cereals, Legumes, Fats and Oils, Milk and Milk Products.

UNIT – IV: **[15 Hrs]**

 **Food Quality and Food Adulteration-** Food adulteration – Definition, Types, Microbial Contamination, Metallic Contamination, Packaging Hazards, food law and standards.Food additives and its ill effects.

UNIT – V: **[15 Hrs]**

 **Food Preservation and Future Foods -** Methods of food preservation - by low temperature, by high temperature, by preservatives, by high osmotic pressure, by high salt concentration, by dehydration.Biotechnology in food, Biofortification, Nutraceuticals, Organic foods, Low cost nutrient supplement, space food.

**TEXT BOOKS:**

1. Dr. M.Swaminathan, Hand Book of Food and Nutrition, 5th Edition, 2006, Bangalore Press.
2. C. Gopalan, B. V. Ramasastri and S.C. Balasubramanian Nutritive value of Indian Foods, National Institute of Nutrition, Indian Council of Medical Research, Hyderabad 1999.
3. B.Srilakshmi, Food Science.

**REFERENCE:**

1. Srilakshmi B., Food Science, 3rd Edition, 2006, New Age International Publisher.
2. F.P.Antia & Philip Abraham, Clinical Dietics and Nutrtion, Fourth edition, Published by Manzar khan, Oxford University Press, 1997.
3. 03.Dr.M. Swaminathan, Hand book of Food & Nutrition, the bangalore Printing & Publishing, Bangalore, 2006.

**WEB RESOURCES:**

1. https://www.news-medical.net/life-sciences/What-is-Nutritional-Biochemistry.aspx
2. https://www.inspiredchiropractic.com/10-factors-that-affect-your-metabolism
3. https://www.healthline.com/nutrition/micronutrients#types-and-functions
4. https://www.publichealthnotes.com/food-adulteration-types-of-food-adulteration-and-mitigation-measures/
5. https://www.britannica.com/topic/food-preservation

**COURSE CONTENTS & TEACHING / LEARNING SCHEDULE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Module No** | **Topic** | **No of Lectures** | **Content Delivery Method** | **Teaching Aids** |
| UNIT – I [15 Hrs] |
| 1.1 | Classification of foods | 2 | Teacher – Centered method | Black Board |
| 1.2 | Calorific value of foods, nutritional requirements | 2 | Teacher – Centered method | Black Board |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1.3 | RDA, ICMR Body Mass Index (BMI), | 2 | Teacher – Centered method | Black Board |
| 1.4 | Basal Metabolic Rate (BMR) – determination and factors affecting, | 2 | Teacher – Centered method | Black Board |
| 1.5 | biological value of proteins, energy value of fats, protein calorie deficiency | 3 | Teacher – Centered method | Black Board |
| 1.6 | Kwashiorkor and Marasmus, malnutrition | 2 | Teacher – Centered method | Black Board |
| 1.7 | Obesity, dietary guidelines for Indians. | 2 | Teacher – Centered method | Black Board |
| UNIT- II [15 Hrs] |
| 2.1 | water soluble and fat soluble vitamins | 2 | Content-Focused method | LCD projector |
| 2.2 | structure, sources of vitamins | 3 | Content-Focused method | LCD projector |
| 2.3 | Functions of vitamins | 3 | Content-Focused method | LCD projector |
| 2.4 | deficiency symptoms of vitamins | 2 | Content-Focused method | LCD projector |
| 2.5 | Macrominerals | 3 | Content-Focused method | LCD projector |
| 2.6 | Micro Minerals | 2 | Content-Focused method | LCD projector |
| UNIT – III [15 Hrs] |
| 3.1 | Functional classification of food | 3 | Content-Focused method | LCD projector |
| 3.2 | Infant nutrition | 2 | Content-Focused method | LCD projector |
| 3.3 | modification of animal milk for infant feeding, processed infant foods, supplementary food | 2 | Content-Focused method | LCD projector |
| 3.4 | Nutrition of school children, adolescents, pregnant and lactating mothers. | 5 | Content-Focused method | LCD projector |
| 3.5 | Effect of cooking and heat processing on the nutritive value of foods | 3 | Content-Focused method | LCD projector |
| UNIT- IV [15 Hrs] |
| 4.1 | Food adulteration | 2 | Content-Focused method | LCD projector |
| 4.2 | Types of Food adulteration | 3 | Content-Focused method | LCD projector |
| 4.3 | Microbial Contamination, Metallic Contamination | 3 | Content-Focused method | LCD projector |
| 4.4 | Packaging Hazards | 2 | Content-Focused method | LCD projector |
| 4.5 | Food law and standards | 2 | Content-Focused method | LCD projector |
| 4.6 | Food additive and its ill effects | 3 | Content-Focused method | LCD projector |
| UNIT – V [15 Hrs] |
| 5.1 | Methods of food preservation | 3 | Content-Focused method | LCD projector |
| 5.2 | Biofortification | 2 | Content-Focused method | LCD projector |
| 5.3 | Nutraceuticals | 3 | Content-Focused method | LCD projector |
| 5.4 | Organic foods | 2 | Content-Focused method | LCD projector |
| 5.5 | Low cost nutrient supplement | 3 | Content-Focused method | LCD projector |
| 5.6 | space food | 2 | Content-Focused method | LCD projector |

**MAPPING OF COs WITH POs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | 1 | 1 | 2 | 1 | 1 |
| **CO2** | 3 | 3 | 3 | 1 | 3 |
| **CO3** | 3 | 3 | 3 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 1 | 3 |

3-Strong 2 –Medium 1-Low

**COURSE DESIGNER: Dr.R. ANITHA JOTHI**

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**Elective Major PROJECT Code: 172804406**

 **SEMESTER IV 10 Hrs/Week**

 **Credits 6**

***PREAMBLE:***

* ***To discover the answers to questions through the application of scientific procedures.***
* ***To get intellectual joy of doing some creative work.***
* ***To achieve new insign into it*.**

Individual dissertation work is allotted to the students in the final semester for the Partial fulfilment of Master degree in Biochemistry.

Total Marks : 100 [Internal (40) + External (60)]

Duration : 3 Months.

Guides:

 Students are supported by the Guidance extended by our faculty members. The Individual performance and the Subject knowledge of the students will be assessed.

Topic Selection:

 Project titles are selected according to course curriculum by the students under the consultation of their guide.

Dissertation Submission:

* The total number of pages of the dissertation should be not less than 40.
* Two copies of dissertation duly certified by the guide should be submitted for the evaluation, at end of the IV semester on a date which will be fixed by the Head of the Department.

Evaluation:

 Both Internal and External evaluations are made accordingly by conducting VIVA and presentations in the presence of both External and Internal Examiners.

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**MEDICAL LABORATORY TECHNOLOGY**

**Self-Learning Course SEMESTER IV Code: 218004428**

 **Add. Credits 3**

***Preamble:***

* ***To understand the concepts in Host, Pathogen interaction, disease cycle.***
* ***To provide a wide sense of knowledge in physiological and clinical pathology of human.***

UNIT – I:

Ogranisation and safety regulations – Functional components of clinical laboratories, Biosafety levels, communication between physician and clinical laboratory professionals in laboratory, and reporting results.

UNIT – II:

 Laboratory equipment and basic laboratory operation.

 Cleaning of glasswares – pipettes, micropipettes pipetting – sources of error, calibration of pipette, laboratory reagents – storage handling.

 **Microscope** – components of light microscope – procedure for using microscope, centrifuge – standaridization of centrifuge, colorimeter and spectrophotometer – Autoclave. Preparation of material for autoclaving.

UNIT – III:

 Specimen collection – Introduction, blood collection methods, equipments for blood collections, venipuncture, capillary puncture, storage of blood specimen.

 Urine, Sputum, Throat swab, CSF and Tissue-biopsy and methods of discarding specimens.Transportation of blood sample, Urine and microbial culture.

UNIT – IV:

 **Routine Haematological Tests** – Haemoglobin concentration, ESR methods, Factors affecting ESR, Normal value, importance ,RBC indices, WBC, Blood group identifications, morphological of blood cells, platelet counts.

UNIT – V:

 **Clinical pathology and urine analysis** – Physiology of urine formation, composition of normal urine, changes in standing urine, preservatives of urine specimens, physical examination – Volume, colour, appearance, microscopic examination of urine sediment – Identification of microscopic elements found in urine sediment –,chemical tests of urine-Sugar, Protein and Ketone bodies

**TEXT BOOKS**:

1. Kanai L.Mukherjee, Medical Laboratory Technlogy – A Procedure Manual for Routine Diagnostic Tests, Vol. I & II, Tata McGraw – Hill Publishers.
2. 02.Dr.V.Satyanarayan, Biochemistry, Books & Allied (P) Ltd.,2008

**REFERENCE:**

1. Lab manual in Biochemistry, Pattabiraman.
2. Alem H.Gowenlock, Varley’s Practical Clinical Biochemistry, 6th Edition, CBS Publishers and Distributors.
3. Kasper Braunwald Fauci Hauser Longo Jameson, Harrisons’vs, Principles of Internal Medicine, sixteenth Edition.,2005

**WEB RESOURCES:**

1. https://www.txstate.edu/chemistry/student-resources/Stockroom/cleaning-laboratory-glassware.html
2. https://pathlabs.ufl.edu/client-services/specimen-shipping/blood-collection-process-venipuncture/
3. https://biosci.mcdb.ucsb.edu/immunology/Cells-Organs/blood-cell-morphology.htm
4. https://ulbld.lf1.cuni.cz/file/3375/urine-chemical1819.pdf

**COURSE DESIGNER: Miss. M. GLORY JASMINE RANI**

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