PREAMBLE

- Biochemistry is the study of chemistry and relating to, biological organisms.
- Biochemistry is sometimes viewed as a hybrid branch of organic chemistry which specializes in the chemical processes and chemical transformations that take place inside of living organisms.
- All life forms alive today are generally believed to have descend from a single proto-biotic ancestor, which could explain why all known living things naturally have similar biochemistries.
- Biochemistry essentially remains the study of the structure and functions of cellular components (such as enzymes and cellular organelles) and the processes carry out both on and by organic macromolecules - especially proteins, but also carbohydrates, lipids, nucleic acids and other biomolecules.
- Biochemistry is most simply put, the chemistry of life.
## ABILITY ENHANCEMENT COMPULSORY COURSE

AECC-1: English communication  
AECC-2: Environmental Studies
PROGRAMME OUTCOME (POs).
The Biochemistry graduate will be able to acquire

a. **Critical Thinking and Language Training:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives. To train them to communicate science by improving their English vocabulary. Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

b. **Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

c. **Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings. Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

d. **Understanding cellular function:** To equip them with basic and advanced knowledge in cell biology in order to get entry/placed in cell based research and development institution/laboratories.

e. **Protein based skills:** To make them understand protein, enzymes and human physiology to lay solid foundation and to get through competitive examinations. To equip them to get placed in recombinant protein production industries/laboratory.

f. **Understanding of endocrine system and metabolism:** To train them on the regulatory role of hormone on the metabolism of carbohydrates, lipids, amino acids and nucleic acid.

g. **Molecular and Genetic understanding:** To train them on the genetic regulation of immune system and to use computational tools.

h. **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.

i. **Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

j. **Skill development:** To gain hands on experience on various biochemical experiments and to equip them to interpret the data.

PROGRAMME SPECIFIC OUTCOME (PSOs)

k. Be able to demonstrate foundation knowledge in the areas of Biochemistry like cell biology, biomolecules, protein biochemistry, molecular biology, Pharmaceutical chemistry and hormonal biochemistry
l. Be able to integrate knowledge learned in discipline specific courses like Microbiology, Plant Biochemistry, Nutritional biochemistry, Biostatistics, Drug Biochemistry and biotechnology

m. To use standard laboratory protocols in biochemistry, modern instrumentations, proper laboratory safety protocols and classical techniques to carry out experiments and also use computers in data acquisition and processing and use available software as a tool in data analysis.

n. To understand the applications of biological sciences in genetics, biochemical correlations of diseases, microbiology, Genetic engineering and biotechnology

PROGRAMME EDUCATIONAL OBJECTIVE (PEO)

I. To give students a basic knowledge in biochemistry and to teach on ethics.

II. To develop analytical and critical-thinking skills that allows independent exploration of biological phenomena through the scientific methods.

III. To acquaint knowledge on modern methods of biochemical experimentation to implement for future studies.

IV. To motivate students for social responsibilities and to educate them on ethical values in addition to inculcating environmental awareness.

V. To enable them to execute a research objective through experimentation.

Mapping of PEOs and POs

<table>
<thead>
<tr>
<th>POs</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
<th>l</th>
<th>m</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO I</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>PEO II</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PEO III</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PEO IV</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>PEO V</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### B.Sc., Biochemistry

**18LSU101**  
**MIL-1**  
**Semester I**

<table>
<thead>
<tr>
<th>Instruction Hours / week: L:4  T:0  P:0</th>
<th>Marks: Internal: 40  External: 60  Total: 100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>End Semester Exam:</strong></td>
<td>3 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>பதிவு - I. கல்வி</th>
<th>18LSU101</th>
</tr>
</thead>
<tbody>
<tr>
<td>(திருத்த அறிவியல் படை மதகுறுக்கிழப்பு)</td>
<td></td>
</tr>
</tbody>
</table>

#### ஆண்டு - I: திசைன் வரலாற்றியம்:

(10 மணிக்குறிகள்)

1. பார்வையியர் - படை மதகுறுக்கிழப்பு
2. தொகுத்துறை: படையுருக்கழகம், ஆராய்ச்சியின் - 20 மணிக்குறிகள்
3. பார்வையியர்: 1-50 மணிக்குறிகள்

#### ஆண்டு - II: அறிவியல்:

(8 மணிக்குறிகள்)

1. பார்வையியர்: படையுருக்கழகம், ஆராய்ச்சியின் - 20 மணிக்குறிகள்
2. பார்வையியர்: 1-26 மணிக்குறிகள்
3. பார்வையியர்: 2 மணிக்குறிகள்

#### ஆண்டு - III: கல்வி வியநைகியம்:

(8 மணிக்குறிகள்)

1. பார்வையியர்: 1-26 மணிக்குறிகள்
2. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்

#### ஆண்டு - IV: கல்வி:

(8 மணிக்குறிகள்)

1. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்
2. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்
3. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்
4. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்
5. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்

#### ஆண்டு - V: மாதிரிப்புக்கிடைப்

(6 மணிக்குறிகள்)

1. பார்வையியர்: மேலாளர் - 9 மணிக்குறிகள்
2. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்
3. பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்
4. பார்வையியர்: எண் வியநைкியம் - 9 மணிக்குறிகள்

பார்வையியர்: எண் வியநைகியம் - 9 மணிக்குறிகள்

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore – 641 021
Course Objectives:
- To train students to acquire proficiency in English by reading different genres of literature and learning grammar.
- To provide aesthetic pleasure through literature.

Course outcomes (CO’s):
- Communication skills will get developed.
- Genres of literature will give moral values of life.

UNIT - I: Prose
1. Morals in the Indian Context - Francis Nicholas Chelliah
2. How Comic Books help us to relive our Childhood - Benoit Peeters
3. Let’s Do What India Needs From Us - Dr. A.P.J. Abdul Kalam

UNIT - II: Poem
1. The Stolen Boat - William Wordsworth
2. Telephone Conversation - Wole Soyinka
3. A River - A.K. Ramanujan

UNIT - III: Short stories
1. Rapunzel - Brothers Grimm
2. The Ant and The Grasshopper - W. Somerset Maugham
3. The Nightingale and the Rose - Oscar Wilde.

UNIT - IV: Drama
1. The Merchant of Venice - Act 4 - Scence 1
2. The Death Trap - Saki

UNIT - V: Grammar and Composition
Grammar: 1. Tenses
2. Articles
3. Auxiliaries (Primary and Modal)
4. Tag Questions
Composition: 1. Reading to Comprehend
2. Letter Writing
3. Resume Writing
4. General Essay

Prescribed Text: Reminisce, Published by the Department of English, Karpagam Academy of Higher Education.
Course objectives
- To understand the properties and importance of water in biological system
- To know the various biomolecules present in biological system
- To introduce the importance of vitamins in human body

Course outcomes (CO's)
1. Recognize water as a universal solvent and elixir of life by knowing its importance
2. Identify the properties and classification of carbohydrates
3. Recall the role of various lipids in biomembrane including signal transduction
4. Categories the aminoacids and know their properties
5. Differentiate the structure, properties and functions of DNA and RNA
6. List the functions and deficiency disease of fat and water soluble vitamins

Unit I: The foundations of biochemistry and water
Cellular and chemical foundations of life. Unique properties, weak interactions in aqueous systems, ionization of water, buffers, water as a reactant and fitness of the aqueous environment.

Unit II: Carbohydrates and glycobiology
Monosaccharides - structure of aldoses and ketoses, ring structure of sugars, conformations of sugars, mutarotation, anomers, epimers and enantiomers, structure of biologically important sugar derivatives, oxidation of sugars. Formation of disaccharides, reducing and non-reducing disaccharides. Polysaccharides – homo- and heteropolysaccharides, structural and storage polysaccharides. Structure and role of proteoglycans, glycoproteins and glycolipids (gangliosides and lipopolysaccharides). Carbohydrates as informational molecules, working with carbohydrates

Unit III: Lipids

Unit IV: Amino acids and Nucleic acids

Unit V: Vitamins
Structure and active forms of water soluble and fat soluble vitamins, deficiency diseases and
symptoms, hypervitaminosis

SUGGESTED READING


Course objectives

- To understand the basic structure of cell and model organism for its study
- To know the tools required for studying cell morphology
- To enlight the students with structure and functions of various organelle
- To understand the cytoskeletal network and extracellular matrix
- To introduce the cell cycle, cell division and cell death process

Course outcomes (CO’s)

1. Differentiate the prokaryotic and eukaryotic cell
2. Understand the principle behind studying the cell morphology using various microscope
3. Identify the structure and functions of each organelle in cell
4. Recognise the mechanism behind the protein sorting and transport to their destinations like lysosome, mitochondria and chloroplast
5. Maintenance of cytoskeleton structure and function of micro, macro and intermediary filaments
6. Identify the proteins involved in cell cell interaction
7. Enumerate the phases of cell cycle, events in cell division and mechanism of cell death

Unit I: Introduction to cell biology

Prokaryotic (archaea and eubacteria) and eukaryotic cell (animal and plant cells), cells as experimental models.
Plasma membrane: Composition, Fluid mosaic model

Unit II: Structure of different cell organelles

Structure of nuclear envelope, nuclear pore complex. Selective transport of proteins to and from the nucleus. Regulation of nuclear protein import and export.
ER structure. Targeting proteins to ER, smooth ER and lipid synthesis. Export of proteins and lipids from ER and into ER. Protein folding in ER
Peroxisomes and Zellweger syndrome.

Unit III: Protein trafficking

Lysosome. – Acid hydrolases, phagocytosis and autophagy.
Mitochondria-Structure and functions, protein import and mitochondrial assembly, protein export from mitochondrial matrix.
Chloroplasts- Import and sorting of chloroplast proteins.
Unit IV: Cytoskeletal proteins

Unit V: Cell wall and extracellular matrix
Prokaryotic and eukaryotic cell wall, cell matrix proteins. Cell-matrix interactions and cell-cell interactions. Adherence junctions, tight junctions, gap junctions, desmosomes, hemidesmosomes, focal adhesions and plasmodesmata.


SUGGESTED READING

Course objectives

- This course elucidates in detail the structural and functional importance of biomembranes in cellular existence.
- The course provides an in-depth understanding on the concept of sub-cellular compartmentalization within a cell and its biological implications.

Course outcomes (CO’s)

1. The course gives a sound knowledge on structure, organization and constitutional dynamics of biomembrane.
2. The course lights the importance of photosynthetic system in Biomembranes.

Unit I: Biomembranes, membrane structures and membrane dynamics

Unit II: Membrane transports

Unit III: Vesicular transport, membrane fusion and bioenergetics

Unit IV: Oxidative phosphorylation
Mitochondria. Electron transport chain- its organization and function. Inhibitors of ETC

Unit V: Photophosphorylation

SUGGESTED READING


B.Sc., Biochemistry 2018-2019

Semester I

18BCU111 MOLECULES OF LIFE PRACTICAL

Instruction hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

- To know the safety measures to be followed in laboratory
- To give hands on experience on the preparation of buffers and various solutions.
- To identify and separate the biomolecules
- To quantify the vitamin in a sample

Course outcomes (CO’s)

1. Gain knowledge on lab safety
2. Trained on preparation of reagents and solution
3. Able to analyse biomolecules and vitamins qualitatively and quantitatively
4. Handle the instruments associated with the practical

1. Safety measures in laboratories.
2. Preparation of normal and molar solutions.
3. Preparation of buffers.
4. Determination of pKa of acetic acid and glycine.
5. Qualitative tests for carbohydrates, lipids, amino acids, proteins and nucleic acids.
7. Estimation of vitamin C.
8. Estimation of vitamin E.

SUGGESTED READING


B.Sc., Biochemistry

18BCU112 CELL BIOLOGY PRACTICAL

Instruction hours/week: L:0  T:0  P:4  Marks: Internal: 40  External: 60  Total: 100

End Semester Exam: 3 Hours

Course Objectives

- To train the students in the preparation of biological material for staining, staining procedure and visualization of stained slides
- To identify the different stages of cell division in a biological material
- To acquire knowledge in the techniques involved with the sub cellular fractionation of cell organelles

Course outcomes (CO’s)

1. Able to prepare slides for staining procedure and visualization of materials
2. Interpret various stages of cell division
3. Understand the principle behind the sub cellular fractionation of organelles and the techniques involved.

1. Preparation of onion root squash and observation of cell
2. Visualization of animal and plant cell by methylene blue staining
3. Identification of different stages of mitosis in onion root tip.
4. Identification of different stages of meiosis in grasshopper testis.
5. Cell size determination using ocular stage micrometer
6. Micrographs of different cell components (dry lab).
7. Sub-cellular fractionation.
8. Visualization of nuclear fraction by acetocarmine stain.

SUGGESTED READING


Course objectives

- To introduce and to explain the basic concepts in Membrane biology and Bioenergetics.
- To develop more adequate understanding of cellular and biotechnological processes.
- In practical training students learn the principal research methods in Membrane biology and Bioenergetics, develop skills for problem solving.

Course outcomes (CO’s)

1. The aim of course is to deepen student’s knowledge on structure, function and pathology of biological membranes with particular emphasis on principles of energy transformation (bioenergetics).
2. The practical course gives a complete hands-on understanding of the functions of membranes.
3. The practical sessions gives practical understanding of basis membrane related experiments.

1. Effect of lipid composition on the permeability of a lipid monolayer.
2. Determination of CMC of detergents.
3. RBC ghost cell preparation and to study the effect of detergents on membranes.
4. Separation of photosynthetic pigments by TLC.
5. Isolation of mitochondria from liver and assay of marker enzyme SDH.
6. Study photosynthetic O$_2$ evolution in hydrilla plant.

SUGGESTED READING

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>18LSU201</td>
<td>MIL-2</td>
</tr>
</tbody>
</table>

**B.Sc., Biochemistry 2018-2019**

**Semester II**

<table>
<thead>
<tr>
<th>Instruction hours/week: L:4  T:0  P:0</th>
<th>Marks: Internal: 40  External: 60  Total: 100</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>End Semester Exam: 3 Hours</strong></td>
</tr>
</tbody>
</table>

**B. Sc. - I, Tamil**

18LSU201: தகுதி காலம் (2018-2019)

| கோடியிருந்து போக்கும் காலம் | 4-H, 4-C |

| அங்கெருந்து - I: பக்கி டெக்கிலியம் | (10 மணிப்பு) |

| முருகன் காலம் - பாசல -110 |
| கேரளிலியம்: காலம் - காலம் - காலம் - 69 |
| தொடற்றப்பது: சிற்றுரு - கருப்பு பாருது - 171 |

| பிள்ளைப்பாடு: சிற்றுரு - பாசறு - 27 |

| பக்கிரமம்: பக்கிரமம், காட்டை - காட்டை காட்டைப்பாடு - 110 |
| கேரளிலியம்: காலம் - காலம் - 69 |
| தொடற்றப்பது: சிற்றுரு - 69, கருப்பு பாருது - 10, காலம் - மேற்பாறு - 11. |

| கேரளிலியம்: கேரளிலியம் - கேரளிலியம் - 36 |

| ஆக்கமாது: ஆக்கமாது, மயில் மயில் மயில் - மயில் - 48 |

| புகைப்பாடு: புகைப்பாடு, மயில் - புகைப்பாடு - 192 |

| அங்கெருந்து - II: கோடியிருந்து போக்கும் காலம் | 4-H, 4-C |

| கோடியிருந்து போக்கும் காலம் | 4-H, 4-C |

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore – 641 021
ப௃ருகன் இருப்திடங்கள் – 'சிறுடி சிறுடி'
சிறுடியுடைய காரணம், 'அரஞ்சுக்கள்' சரமாக அவர்களுக்கு விளக்கங்கள்: 218-249.

ப௃ருகன் அருள்புரிகள் – 'சிறுடி சிறுடி' காரணிகளுக்கு விளக்கங்கள், 'உடலம்' சரமாக அவர்களுக்கு விளக்கங்கள்: 286-295.

அந்த - III : கரப்புத்தை (6 மூலக்கூறுகள்)

குடியுரிமைகள்:
சிறுடி உறுப்புப் பங்கு (21-29) – கரம்மான் கிளிப்பு:
‘பொதுக்குத் தகத்கு’ சர்மானிகளுக்கு விளக்கங்கள்,
‘சுருக்கமாகச் செய்துச் செல்லும்’ சரமாக அவர்களுக்கு விளக்கங்கள்.

குருத்துக்கள்: (207-234) - சீர்த் சின்னாகம் கரம்மான் விளக்கம் விளக்கம்: 'அரஞ்சுக்கள்' சர்மானிகளுக்கு விளக்கங்கள்,
‘பொதுக்குத் தகத்கு’ சரமாக அவர்களுக்கு விளக்கங்கள்.

பொறுக்குத்துக்கள்: (482-485) - கரம்மான் விளக்கத்தைக் கரம்மான் விளக்கத்தை விளக்கத்தை: 'சிறுடி' சரமானிகளுக்கு விளக்கங்கள்,'அரஞ்சுக்கள்
சின்னாகம் விளக்கங்கள்' சரமாக அவர்களுக்கு விளக்கங்கள்.

பொறுத்துக்கள்: பிள்ளையின் பரத்து வரும் கால்: ‘திருமண நாள்கள்’ சரமானிகளுக்கு விளக்கங்கள்,'பொதுக்குத் தகத்கு’ சரமாக அவர்களுக்கு விளக்கங்கள்.

பொறுத்துக்கள்: பொறுத்துக்கள் சின்னாகம் விளக்கம்: பத்தாண்டு பத்தாண்டு விளக்கம், ‘அரஞ்சுக்கள்’ சரமானிகளுக்கு விளக்கங்கள்.

அந்த - IV : பிற்காலக் (10 மூலக்கூறுகள்)

1. குதியுரிமைகள்-பகுதிக்குத் தகத்கு
2. கரம்மான் உறுப்புப் பங்கு - அமைப்பு
3. குருத்துக்கள் – பரத்து
4. புராணம் - நகராட்சிகள்

அந்த - V : பாடலியுரிமைகள் (7 மூலக்கூறுகள்)
மக்களியுரிமைப் பாடலியுரிமை (கரம்மான், உறுப்புப் பங்கு, நகராட்சிகள்)
மக்களியுரிமைப் பாடலியுரிமை

மரப்புரட்டம்: காப்டி஦ம் (6 மூலக்கூறு)
சின்னாகம் கரம்மான் விளக்க ஆத்மாத்மாதிரியான.
Course Objectives

- The main objective of the course explains about the physical and chemical properties of proteins.
- The course exhibits in depth knowledge on its structural organization, separation, purification and characterization of proteins by adopting various methods and techniques.
- The course also describes about some applications of specialized proteins.

Course outcomes (CO’s)

1. The student gathers information on protein structure, its separation techniques and other latest developments.
2. Information on specialized proteins and its application will be known to the students.

Unit I: Introduction, Extraction and Separation of Proteins


Unit II: Purification and Characterization of proteins

Chromatographic Techniques - Ion-exchange chromatography, molecular sieve chromatography, hydrophobic interaction/reverse phase chromatography, affinity chromatography, HPLC (Normal and Reverse phase) and FPLC. Characterization of proteins - Determination of purity, molecular weight, extinction coefficient and sedimentation coefficient, IEF, SDS-PAGE and 2-D electrophoresis.

Unit III: Structural Organization and Analysis of proteins


Unit IV: Three dimensional structures of protein and Protein Structure Database

renaturation of Ribonuclease A. Introduction to thermodynamics of folding and molten
globule. Assisted folding by molecular chaperones, chaperonins and PDI. Defects in
protein folding. Diseases – Alzheimers and Prion based. Protein sequence and structure
databases (PDB). Use of sequence and domain information. Viewing protein structures
using in silico tools.

Unit V: Specialized Proteins and its Applications
Myoglobin and haemoglobin - Oxygen binding curves, influence of 2,3-BPG, CO2 and
Cl- Hill plot. Cooperativity between subunits and models to explain the phenomena –
concerted and sequential models. Haemoglobin disorders. Antibodies - Antibody
structure and binding to antigens. Actin-myosin motors - ATP activated actin - myosin
contractions. Membrane Proteins - Integral and membrane associated proteins.
Hydropathy plots to predict transmembrane domains. Significance of membrane
proteins - bacteriorhodopsin.

SUGGESTED READING


Course objectives

- To understand the basic concepts of enzymes
- To study the kinetics of enzyme catalysed reactions
- To learn the mechanism of action of enzymes and enzyme inhibition concepts
- To understand various modes of enzyme regulation
- To learn the application of enzymes in health and diseases

Course outcomes (CO’s)

1. Understand the basic concepts on enzymes
2. Relate the initial velocity and substrate concentration of enzymes and be able to understand the kinetics of inhibition reactions
3. Able to understand the regulation pattern of various enzymes
4. Relate the regulation pattern of enzymes for its application in health and diseases
5. Understand the application of enzymes as marker in various disease conditions

Unit I: Introduction to enzymes and enzyme catalysis
Introduction - Nature of enzymes - protein and non-protein (ribozyme). Cofactor and prosthetic group, apoenzyme, holoenzyme. IUBMB classification of enzymes. Features of enzyme catalysis- Factors affecting the rate of chemical reactions, collision theory, activation energy and transition state theory, catalysis, reaction rates and thermodynamics of reaction. Catalytic power and specificity of enzymes (concept of active site), Fischer’s lock and key hypothesis, Koshland’s induced fit hypothesis.

Unit II: Enzyme kinetics

Unit III: Mechanism of action of enzymes and Enzyme inhibition

Unit IV: Regulation of enzyme activity
Control of activities of single enzymes (end product inhibition) and metabolic

Unit V: Coenzymes
Coenzymes in enzyme catalysed reactions and Applications of enzymes. Structure and Functions of TPP, FAD, NAD, pyridoxal phosphate, biotin, coenzyme A, tetrahydrofolate, lipoic acid. Applications of enzymes - Application of enzymes in diagnostics (SGPT, SGOT, creatine kinase, alkaline and acid phosphatases), enzyme immunoassay (HRPO), enzyme therapy (Streptokinase). Immobilized enzymes – Preparation techniques and its applications.

SUGGESTED READING


Course objectives

- Human Physiology aims to promote mechanistic advances in human integrative and translational physiology.
- Human Physiology provides a forum for many physiological areas.

Course outcomes (CO’s)

1. The purpose of this course is to promote knowledge in the integration of theories, methods and research in human physiology.
2. It gives and exposure about human anatomy and physiology.
3. Student would know about their own body system and its functions.

Unit I: Homeostasis and the organization of body fluid compartments


Unit II: Cardiovascular physiology
Pressure, flow and resistance. Anatomy of heart. Physiology of the cardiac muscle, automacity of the cardiac muscle contraction, excitation contraction coupling, relationship between cardiac cycle, heart sound, ventricular volumes and the ECG, control of cardiac function and output. The arterial system, venous system, the microcirculation and mechanics of capillary fluid exchange. Control of blood flow to the tissues. Portal circulations. Arterial pressure and its regulation. Hypertension, congestive heart disease, atherosclerosis and myocardial infarction.

Unit III: Renal physiology

Unit IV: Gastrointestinal and hepatic physiology
Histology of the gastrointestinal tract. Propulsion and motility of food and digested
material. Enteric reflexes, secretory functions of the gastrointestinal tract, digestion and absorption of macro and micronutrients. Peptic ulcer, Sprue, celiac disease, IBD, regurgitation, diarrhoea and constipation. Anatomy of the hepatic lobule and blood flow into the liver. Formation and secretion of bile. enterohepatic cycle, reticuloendothelial system, metabolic importance of liver. Liver function tests. Jaundice, liver cirrhosis and fatty liver.

**Musculosketetal system:** Bone structure and formation. Physiology of muscle contraction in striated and non-striated muscle.

**Unit V: Reproductive physiology**


**SUGGESTED READING**


Course Objective:
This practical course on proteins describes about the qualitative and quantitative analysis, as well as its purification and characterization.

Course outcomes (CO’s):
By the end of the course, students can be able to demonstrate the importance of the protein chemistry and their wide applications.

1. Estimation of proteins using UV absorbance and Biuret method.
3. Isoelectric pH of casein.
5. Separation of albumin from serum using anion-exchange chromatography.
6. SDS-PAGE analysis of proteins.

SUGGESTED READING


B.Sc., Biochemistry

18BCU212 ENZYMES PRACTICAL

Instruction hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

- To know the sources of enzymes and study the extraction and partial purification of enzyme acid phosphatase
- To standardize the optimum pH, optimum substrate concentration required for the maximum activity of acid phosphatase
- To analyse the inhibition pattern by various competitive inhibitors for the enzyme acid phosphatase purified from germinated mung bean
- To assay the activity of Lactate dehydrogenase and glucose – 6 – phosphate dehydrogenase enzymes

Course outcome (CO’s)

1. The students will be expertise in extraction of protein from germinated mung bean.
2. Understand the purification process of enzyme.
3. Analyze the optimum pH, substrate concentration for the maximum enzyme activity.

   1. Partial purification of acid phosphatase from germinating mung bean.
   2. Assay of enzyme activity and specific activity, e.g. acid phosphatase.
   3. Effect of pH on enzyme activity
   4. Determination of $K_m$ and $V_{max}$ using Lineweaver-Burk graph.
   5. Enzyme inhibition - calculation of $K_i$ for competitive inhibition.
   6. Continuous assay of lactate dehydrogenase.
   7. Assay of glucose-6-phosphate dehydrogenase.

SUGGESTED READING

Course objective

- The course gives a depth practical knowledge on different physiological examinations.

Course outcomes (CO’s)

1. The course exposes to significant human physiological measurements.
2. Students would get an opportunity to view their own blood cells, their grouping, and separation of isoenymes.
3. Students are exposed to histological viewing of different organs under a microscope.

1. Hematology.
   a. RBC and WBC counting
   b. Differential leucocyte count.
   c. Clotting time.
   d. Bleeding time
2. Estimation of haemoglobin.
3. Determination of blood groups
4. Separation of plasma proteins (Group Experiment).
5. Determination of total iron binding capacity.
6. Pulmonary function tests, spirometry and measurement of blood pressure.
7. Separation of isoenzymes by electrophoresis (Group Experiment).
8. Histology of connective tissue, liver and/ brain - permanent slides.
9. Case studies (Renal clearance, GFR, ECG).

SUGGESTED READING


Course objective

- To develop an attitude of concern for the environment.
- To know the social issues of the environment.
- To understand the core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- To know about the various renewable and nonrenewable resources of the region.

Course outcomes (CO’s)

1. Make appropriate judgments and decisions for the protection and improvement of the earth.
2. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
3. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.

UNIT I: Introduction - Environment


Unit II: Natural Resources - Renewable and Non-renewable Resources

Natural resources and associated problems. Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources : Use and over-utilization, exploitation. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ill-effects of fireworks.

Unit III: Biodiversity and Its Conservation


Unit IV: Environmental Pollution

Unit V: Social Issues and the Environment

SUGGESTED READING


