Sem.	Course Code	Core I: Professional English I	Total Marks: 100		Hours / Week	Credits
I	21UAPCT101		CIA: 50	ESE: 50	4	4

Course Objectives:

1. To develop the language skills of students
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence
3. To focus on developing students' knowledge of domain specific registers and the required language skills

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Identify the correct usage of vocabulary and grammar in speaking and writing	K1 - K4
CO 2	Demonstrate the language skills through academic writing	
CO 3	Apply the communicative skills by responding to given situations	
CO 4	Communicate leadership quality and team building	
CO 5	Analyze the information in various circumstances	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Communication

Listening: Listening to audio text and answering questions -Listening to Instructions

Speaking: Pair work and small group work.

Reading: Comprehension passages –Differentiate between facts and opinion

Writing: Developing a story with pictures.

Vocabulary: Register specific - Incorporated into the LSRW tasks

Unit - II Description

Listening: Listening to process description.-Drawing a flow chart.

Speaking: Role play (formal context)

Reading: Skimming/Scanning-

Reading passages on products, equipment and gadgets.

Writing: Process Description –Compare and Contrast

Paragraph-Sentence Definition and Extended definition-Free Writing.

Vocabulary: Register specific -Incorporated into the LSRW tasks.

Unit - III Negotiation Strategies

Listening: Listening to interviews of specialists / Inventors in fields (Subject specific)

Speaking: Brainstorming. (Mind mapping).

Small group discussions (Subject- Specific)

Reading: Longer Reading text.

Writing: Essay Writing (250 words)

Vocabulary: Register specific - Incorporated into the LSRW tasks

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Unit - IV	Presentation Skills

Listening: Listening to lectures.

Speaking: Short talks.

Reading: Reading Comprehension passages

Writing: Writing Recommendations Interpreting Visuals inputs

Vocabulary: Register specific - Incorporated into the LSRW tasks

Unit - V	Critical Thinking Skills

Listening: Listening comprehension- Listening for information.

Speaking: Making presentations (with PPT- practice).

Reading: Comprehension passages –Note making.

Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills)

Writing: Problem and Solution essay– Creative writing –Summary writing

Vocabulary: Register specific - Incorporated into the LSRW tasks

Skill Development Activities	Max. Marks (10)
Creation of a Mindmap	3
Interpreting a Interview by a Subject Expert	3
Reading and Summarizing a Subject related Research Article	3
Punctuality	1

TEXT BOOK	
1	Professional English for Life Sciences - TANSCHE
REFERENCE BOOK	
1	A Handbook of English for Engineers and Technologists. BS Publications. Eliah P, 2003.
2	English for Professionals, Vayu Education of India, Dr.Sheema Miglani & Shikha Goyal, 2010.
3	Business English, Tata McGraw-Hill Edition, Dona J.Young, 2012
WEB RESOURCES	
1	https://www.classcentral.com/course/swayam-business-english-communication-10097

Course Designed By	Verified By	Approved By HOD
Ms. R. S. CINDHU	Dr. N. SANGEETHA	Dr. A. K. VIDYA

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QUESTION PAPER PATTERN	
Time: 3 hours	**Max. Marks: 50**
SECTION - A (10 X 1 = 10 Marks) (Vocabulary) (MCQ, Info-gap questions –domain specific vocabulary)	**SECTION-B (4 X 10 = 40 Marks)** (Reading :Two long domain-specific comprehension passages with questions pertaining to understanding and analysis – 20 Marks) (Writing: Descriptive/narrative/persuasive writing questions pertaining to domain-specific vocabulary – 20 Marks)

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	M	M	M	S	M	S	S	S	S
CO 2	S	S	S	M	M	M	S	M	S	S	S	M
CO 3	S	S	S	S	M	M	S	M	S	S	S	M
CO 4	S	S	S	S	M	M	S	M	S	S	M	M
CO 5	S	S	S	S	M	M	S	S	S	S	S	S

S - Strong, M - Medium, L - Low

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Sem.	Course Code	Core II: Chemistry of Biomolecules	Total Marks: 100		Hours / Week	Credits
I	21UAPCT102		CIA: 50	ESE: 50	4	4

Course Objectives:

1. To learn about the chemistry and structures of biomolecules
2. To know the properties of different biomolecules
3. To understand the physiological functions of biomolecules

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Relate the classifications of various Biomolecules	K1 - K4
CO 2	Illustrate the structure of carbohydrates, lipids, amino acids and nucleic acids	
CO 3	Compare and Contrast the features of various Biological molecules	
CO 4	Interpret the biological importance of carbohydrates, lipids, amino acids, proteins, nucleic acids, vitamins and minerals	
CO 5	Analyze the properties and applications of complex Biomolecules	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Carbohydrates

Definition, Classification and Functions of Carbohydrates. Isomerization - Stereoisomerism and Optical isomerism of sugars, Cyclic structure, Epimers, Anomers and Mutarotation.

Monosaccharides: Structure, Properties and Functions of Glucose and Fructose.

Disaccharides: Structure, Occurrence and Functions of Sucrose, Lactose and Maltose.

Polysaccharides: Structure, Occurrence and Functions of Starch, Glycogen, Cellulose, Chitin, Inulin, Hyaluronic acid, Chondroitin sulfate and Heparin.

Artificial sweeteners: Structure, Properties and Uses of Saccharin and Aspartame.

Unit - II Lipids

Definition, Classification and Biological role of lipids

Simple lipids: Properties and Characterization of fats – Hydrolysis, Saponification, Halogenation, Acetyl number, Rancidity of fats, Reichert-Meissel number.

Compound lipids: Structure and Functions of Phospholipids and Glycolipids.

Derived lipids: Classification, Structure and Properties of Saturated and Unsaturated fatty acids; Difference between Essential and Non-essential fatty acids.

Plant sterol: Structure and Functions of Ergosterol and Stigmasterol;

Animal sterol: Structure and biological significance of cholesterol.

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Unit - III	Amino Acids and Proteins

Amino acids: Definition, Amino acids as ampholytes, Classification of amino acids based on chemical nature, Chemical reaction of amino acids due to carbonyl and amino groups. Importance of Essential and Non-essential amino acids.

Peptide bond: Structure and significance of peptide bond, Identification of N (Sanger's and Edman degradation method) and C (Hydrazinolysis) terminal residues.

Protein structure: Levels of structure in Protein Architecture - Primary structure (Insulin), Secondary structure (Keratin), Tertiary structure (Myoglobin) and Quaternary Structure (Hemoglobin). Forces stabilizing the structure of proteins

Unit - IV	Nucleic acids

Nucleic acids: Structure of Purines and Pyrimidines; Nucleosides and Nucleotides.

DNA: Watson Crick model of DNA - Chargaff's rule, Characteristic features of DNA; Forms of DNA, Properties of DNA - Denaturation and Renaturation.

RNA: Structure and functions of mRNA, tRNA and rRNA.

Karyotyping: Principle and Applications of Karyotyping.

Unit - V	Vitamins and Minerals

Vitamins: Definition, Classification, Sources, Biological importance and Deficiency symptoms of Fat soluble vitamins and Water soluble vitamins

Minerals: Definition, Classification, Sources, Functions and Deficiency symptoms of Macro minerals (Na, K, Ca, P, Mg, S and Cl) and Micro minerals (Fe, Zn, Mn, I, Cu, Mo and F).

Natural pigments: Biological significance of Chlorophyll, Carotenoids and Anthocyanin.

Skill Development Activities	Max. Marks (10)
Assignment	3
Quiz	3
Model Preparation	3
Punctuality	1

TEXT BOOKS

1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Wolters Kluwer (Inidia) Pvt. Ltd, 8th Edition, 2016.
2. A.C. Deb, Fundamentals of Biochemistry, La Vergne : New Central Book Agency, 11th edition, 2020
3. J. L. Jain, Fundamentals of Biochemistry, 7th edition, S. Chand Publishing, 2016.
4. S. Nagini, Textbook of Biochemistry, Scitech Publications, 2nd Edition, 2007

REFERENCE BOOKS	
1	A.L. Lehninger, D.L. Nelson, M.M. Cox, M.M., Principles of Biochemistry, W.H.Freeman Publishers, 7th Edition, 2017.
2	Garrett & Grisham, Principles of Biochemistry, Saunders College Publishing, 4th Edition, 2010
3	Lubert stryer, Biochemistry, Freeman and company, 9th Edition, 2019
4	S.C. Rastogi, V.N. Sharma, Anuradha Tanden, Concepts in Molecular biology, 1st Edition, 2007

WEB RESOURCES	
1	https://epgp.inflibnet.ac.in/
2	https://byjus.com/neet/important-notes-of-biology-for-neet-biomolecules/

Course Designed By	Verified By	Approved By HOD
Mr. G. KARTHIKEYAN	Dr. N. SANGEETHA	Dr. A. K.VIDYA

QUESTION PAPER PATTERN

Time: 3 hours	Max. Marks: 50

SECTION-A (10 X 1 = 10 Marks)	SECTION-B (5 X 3 = 15 Marks)	SECTION - C (5 X 5 = 25 Marks)
Answer ALL questions Choose the correct answer Two questions from each unit	Answer ALL questions Either or type Two questions from each unit	Answer ALL questions Either or type Two questions from each unit

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	M	S	S	M	M	S	S
CO 2	S	S	M	M	M	M	S	S	M	M	S	S
CO 3	S	S	M	M	M	M	S	S	S	S	S	S
CO 4	S	S	M	M	M	M	S	S	S	S	S	S
CO 5	S	S	M	M	M	M	S	S	M	M	S	S

S - Strong, M - Medium, L - Low

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Sem.	Course Code	Core Biochemistry Practicals - I	Total Marks: 75		Hours / Week	Credits
I & II	21UAPCP203		CIA: 30	ESE: 45	2	3

(Examination at the end of Second Semester)

Course Objectives:

- To enable the students to learn the basic biochemical calculations
- To enable the students to learn the qualitative analysis procedures of Biomolecules
- To enable the students to know the techniques of pH meter and Separation procedures

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Exhibit Knowledge on Biochemical calculations	K1 – K5
CO 2	Develop laboratory skills required for qualitative analysis of Carbohydrates	
CO 3	Get practical exposure with identification of Amino acids	
CO 4	Acquire practical knowledge on qualitative analysis of Lipids	
CO 5	Learn the techniques of pH measurement and chromatography for buffer preparation and separation of samples respectively	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I **Biochemical Calculations**

Preparation of Molar solutions, Normal solutions and Percentage solutions [v/v, w/v].

Unit - II **Qualitative Analysis of Carbohydrates**

a) Monosaccharides - Glucose, Fructose, Xylose,
b) Disaccharides - Sucrose, Maltose and Lactose.
c) Polysaccharides - Starch and Dextrin.

Unit - III **Qualitative Analysis of Proteins and Amino acids**

i) Proteins - Precipitation reactions of proteins, Colour reactions of proteins

ii) Amino acids

a) Histidine b) Tyrosine c) Tryptophan
d) Methionine e) Cysteine f) Arginine

Unit - IV **Qualitative Analysis of Lipids**

a) Solubility test b) Iodine test c) Test for free fatty acids
d) Emulsification test e) Saponification test f) Test for glycerol

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Unit - V	Group and Demonstration Experiments

Group Experiments - Preparation of buffer and its pH measurements using pH meter.

Demonstration Experiment

Separation of Amino acids by Paper Chromatography

Separation of Lipids by Thin Layer Chromatography

TEXT BOOKS

1	David T Plummer. An Introduction to Practical Biochemistry. McGraw-Hill Book Company (UK) Ltd., London, 3rd edition, 1987.
2	Pattabiraman, Laboratory Manual in Biochemistry, ASM publications, 1987.
3	NPTEL Online Course on Experimental Biochemistry
4	S. Shanmugam, T. Sathish Kumar, K. Panner Selvam, Laboratory Handbook on Biochemistry, Published by Asoke K. Ghose PHI Learning Private Ltd, 2010.
5	Beedu Sashidhar Rao, Vijay Deshpande, Experimental Biochemistry, I.K.International Private Ltd., 2005

REFERENCE BOOKS

1	J.Jayaraman, Practical Biochemistry, New Age International, 2001
2	S. Sadasivsam, A. Manickam, Biochemical methods, New Age International publishers, 3rd Edition, 2016

WEB RESOURCES

1	http://biotech01.vlabs.ac.in/
2	https://biocyclopedia.com/index/biotechnology_methods/biochemistry/qualitative_tests.php

Course Designed By	Verified By	Approved By HOD
Dr. N. SANGEETHA	Mr. R. RASU	Dr. A. K.VIDYA

QUESTION PAPER PATTERN

Carbohydrates	Amino acids / Proteins / Lipids	Procedure (for 2 Experiments)	Viva Voce	Record
15	10	10	05	05

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Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	M	S	S	M	M	S	S
CO 2	S	S	M	M	M	M	S	S	M	S	S	S
CO 3	S	S	M	M	M	M	S	S	M	M	S	S
CO 4	S	S	M	M	M	M	S	S	M	M	S	S
CO 5	S	S	M	M	M	M	S	S	M	S	S	S

S - Strong, M - Medium, L - Low

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Sem.	Course Code	Allied I: Chemistry - I	Total Marks: 75		Hours / Week	Credits
I	21UAPAT103		CIA: 30	ESE: 45	4	3

Course Objectives:

- To understand the importance of Atomic structure and chemical bonding
- To know the basic concepts of isomerism and facts of solutions & chemical kinetics.
- To gain the knowledge about Phytochemistry and Industrial Chemistry

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Illustrate the structural elucidation of organic compounds.	K1 - K4
CO 2	Summarize the fundamentals of physical chemistry	
CO 3	Recall the bonding mechanisms and theories of inorganic compounds	
CO 4	Establish the knowledge in polymer chemistry	
CO 5	Classify the different laws of physical chemistry	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Nuclear Chemistry and Molecular orbital Theory

Laboratory principles: Safety and Hygiene in the Chemistry Lab: Storage and Handling of Chemicals. Antidotes and First Aid procedures in chemistry lab.

Nuclear Chemistry: Definition of Atoms, Molecules, Proton, Neutron, Electron, Atomic weight, Atomic number, Isotopes, Isobars, Isotones, Nuclear Fusion and Nuclear Fission.

Chemical bond: Definition of Covalent bond, Ionic bond, Coordinate covalent bond, Hydrogen bond and Vander Waal's Forces.

Molecular Orbital Theory: Concepts of M.O. Theory – Comparison of Bonding and Anti-bonding molecular orbitals, Bond order, Diamagnetism and Para magnetism. Applications of M.O Theory – H_2, N_2, O_2 and F_2.

Unit - II Plastics, Silicones, Dyes and Fertilizers

Plastics: Preparation, Properties and Uses of Poly Vinyl Chloride, Teflon, Polythene and Epoxy Resins. Difference between thermoplastic and Thermosetting polymers.

Silicones: Preparation, Properties and Uses.

Dye: Definition of Chromophore and Auxochrome. Preparation, Properties and Uses of Azo dye (Methyl orange) and Vat dye (Indigo).

Fertilizers: Preparation and uses of Ammonium Sulphate, Ammonium Nitrate, Urea and Triple Super Phosphate.

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Unit - III	Covalent bond, Polar effects and Stereoisomerism

Covalent Bond: Orbital Overlap, Hybridization, Geometry of organic molecules - CH_4, C_2H_2, C_2H_4 and C_6H_6.

Polar Effects: Inductive effect, Electromeric, Mesomeric and Steric effects.

Stereoisomerism: Optical isomerism - Elements of symmetry. Isomerism in Tartaric acid. Racemization and Resolution. Geometric isomerism - Maleic acid and Fumaric acid.

Unit - IV	Solutions and Chemical kinetics

Solutions: Definition of Normality, Molality and Molarity. Types of Solutions. Raoult's law: Statement, Ideal solution - Deviation from ideal behavior. Binary liquid mixtures. Fractional Distillation.

Chemical Kinetics: Introduction, Difference between the Order and Molecularity of the reaction, Methods of Determination of Order of reaction. Effect of Temperature on the reaction rate.

Unit - V	Photo Chemistry and Metallic Bond

Photochemistry: Definition of Photochemical reaction, Comparison of Thermal and Photochemical reaction. Laws of Photochemistry - Grothus Drapers law and Strak Einstein's Law. Quantum yield; Photosensitization - Fluorescence, Phosphorescence and Chemiluminescence.

Metallic Bond: Electron Gas, Pauling and Band Theories, Semiconductors - Extrinsic and Intrinsic.

Skill Development Activities
1. Chart/Model preparation on atomic structure of elements
2. Report on different types of fertilizers and dyes used in industries around your locality
3. Summary on any one Noble Laureate and his contribution in Chemistry

TEXT BOOKS	
1	R. D. Madan, Advanced Inorganic Chemistry, S. Chand & Company, 5th Edition, 2005
2	B. S. Bahl and Arun Bahl, Advanced Organic Chemistry, S. Chand and Company Ltd, 1st Edition, 2017
3	B. S. Bahl, G. D. Tuli and Arun Bahl, Essential of Physical Chemistry, S. Chand and Company Ltd, 3rd Edition, 2007
4	Dr. V. Veeraiyan, Allied Chemistry Paper I & II, 2nd Edition, HpH publications, Chennai
REFERENCE BOOKS	
1	B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, 33rd Edition, Vishal Publication, 2017.
2	B. R. Puri, L.R. Sharma and Madan S.P athania, Elements of Physical chemistry, 30th Edition, Vishal Publication, 2017.
3	R.Gopalan, Analytical chemistry, S.Chand & Co., 2007.

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WEB RESOURCES	
1	https://epgp.inflibnet.ac.in/
2	http://chemed.chem.purdue.edu/genchem/beginners.html

Course Designed By	Verified By	Approved By HOD
Mr. G. KARTHIKEYAN	Mr. R. RASU	Dr. A. K.VIDYA

QUESTION PAPER PATTERN

Time: 3 hours	Max. Marks: 45

SECTION-A (5 X 1 = 5 Marks)	SECTION-B (5 X 3 = 15 Marks)	SECTION - C (5 X 5 = 25 Marks)
Answer ALL questions Choose the correct answer Two questions from each unit	Answer ALL questions Either or type Two questions from each unit	Answer ALL questions Either or type Two questions from each unit

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	M	S	S	M	M	S	S
CO 2	M	S	M	M	M	M	S	S	S	M	S	S
CO 3	M	S	M	M	M	M	S	S	M	M	S	S
CO 4	M	S	M	M	M	S	S	S	S	M	S	S
CO 5	S	S	M	M	S	M	S	S	M	S	S	S

S - Strong, M - Medium, L - Low

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Sem.	Course Code	Allied Practicals - I Chemistry	Total Marks: 50		Hours / Week	Credits
I & II	21UAPAP205		CIA: 25	ESE: 25	2	2

(Examination at the end of Second Semester)

Course Objectives:

- To understand the principles of volumetric analysis.
- To analyse the hardness of water from different sources
- To know about the analysis of organic compounds

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Practice the preparation procedure of normal and molar solutions.	K1 – K5
CO 2	Develop the experience in handling of glass wares and accurate chemical laboratory skill.	
CO 3	Estimate the acid and base solutions by volumetric analysis	
CO 4	Examine the methods of organic analysis	
CO 5	Distinguish the various organic compounds.	

K1: Remember; K2: Understand; K3:Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit I - III **Volumetric Analysis**

1. Estimation of Sodium hydroxide using Standard Sodium carbonate.
2. Estimation of Hydrochloric acid using Standard Oxalic acid.
3. Estimation of Oxalic acid using Standard Sulphuric acid.
4. Estimation of Ferrous sulphate using Standard Mohr salt solution.
5. Estimation of Calcium
6. Estimation of Magnesium
7. Determination of Hardness of Water using EDTA

Unit IV - V **Qualitative Organic Analysis: Systematic Analysis**

1. Detection of Element - Nitrogen compounds only.
2. To distinguish between Aliphatic and Aromatic compounds.
3. To distinguish between Saturated and Unsaturated compounds.
4. Functional group tests for Phenols, Acids (mono and di), Aromatic primary amine, Carbohydrates, Monoamide and Diamide. - Functional groups characterized by Confirmatory test

TEXT BOOKS

1 A. O. Thomas, Practical Chemistry, Scientific Book Centre, Cannanore, 2003

REFERENCE BOOKS	
1	A. Venkateshwaran, R. Veeraswamy and A. R. Kulanthaivelu, S.Chand& Company Limited, 1st Edition, 2001

WEB RESOURCES	
1	https://vlab.amrita.edu/index.php?sub=2&brch=193
2	http://www.iscnagpur.ac.in/study_material/dept_chemistry/3.1_MIS_and_NJS_Manual_for_Qrganic_Qualitative_Analysis

Course Designed By	Verified By	Approved By HOD
Mr. S. NATARAJAN	Mr. R. RASU	Dr. A.K.VIDYA

QUESTION PAPER PATTERN

Volumetric Analysis	Organic Analysis	Record
8	12	05

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	M	M	S	M	S	S	S	M	S	M
CO 2	S	M	M	M	S	M	S	S	M	S	M	S
CO 3	S	M	M	M	S	M	S	S	S	S	S	M
CO 4	S	M	M	M	S	M	S	M	M	S	S	S
CO 5	S	M	M	M	S	M	S	S	S	M	S	M

S - Strong, M - Medium, L - Low

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

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Sem.	Course Code	Core III: Professional English II	Total Marks: 100		Hours / Week	Credits
II	21UAPCT201		CIA: 50	ESE: 50	4	4

Course Objectives:

1. To develop the language skills of students
2. To enhance the lexical, grammatical and socio-linguistic and communicative competence
3. To focus on developing students' knowledge of domain specific registers and the required language skills

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Identify the correct usage of vocabulary and grammar in speaking and writing	K1 - K4
CO 2	Demonstrate the language skills through academic writing	
CO 3	Apply the communicative skills by responding to given situations	
CO 4	Communicate leadership quality and team building	
CO 5	Analyze the information in various circumstances	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I	Communicative Competence

Listening – Listening to two talks/lectures by specialists on selected subject specific topics - (TED Talks) and answering comprehension exercises (inferential questions)

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages

Unit - II	Persuasive Communication

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication

Speaking: debates – Just-A Minute Activities

Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay.

Unit - III	Digital Competence

Listening to interviews (subject related)

Speaking: Interviews with subject specialists (using video conferencing skills)

Creating Vlogs (How to become a vlogger and use vlogging to nurture interests – subject related)

Reading: Selected sample of Web Page (subject area) Writing: Creating Web Pages

Reading Comprehension: Essay on Digital Competence for Academic and Professional Life.

The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area.

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Unit - IV	Creativity and Imagination

Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – E.g. https://www.youtube.com/watch?v=tpvicScuDy0)

Speaking: Making oral presentations through short films – subject based Reading : Essay on Creativity and Imagination (subject based)

Writing – Basic Script Writing for short films (subject based)

- Creating blogs, flyers and brochures (subject based)
- Poster making – writing slogans/captions (subject based)

Unit - V	Workplace Communication & Basics of Academic Writing

Speaking: Short academic presentation using PowerPoint

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting. Writing an introduction, paraphrasing

Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis)

Capitalization (use of upper case)

Skill Development Activities	Max. Marks (10)
Creation of a Mindmap	3
Interpreting a Interview by a Subject Expert	3
Reading and Summarizing a Subject related Research Article	3
Punctuality	1

TEXT BOOKS	
1	Professional English For Life Sciences II–TANSCHE
REFERENCE BOOKS	
1	A Handbook of English for Engineers and Technologists, BS Publications, Eliah P, 2003.
2	English for Professionals, Vayu Education of India, Dr.SheemaMiglani&ShikhaGoyal, 2010.
3	Business English, Tata McGraw-Hill Edition, Dona J.Young, 2012
WEB RESOURCES	
1	https://www.classcentral.com/course/swayam-business-english-communication-10097

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Course Designed By	Verified By	Approved By HOD
Ms. R. S. CINDHU	Dr. N. SANGEETHA	Dr. A. K. VIDYA

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QUESTION PAPER PATTERN	
Time: 3 hours	**Max. Marks: 50**
SECTION-A (10 X 1 = 10 Marks) (Vocabulary) (MCQ, Info-gap questions –domain specific vocabulary)	**SECTION-B (4 X 10 = 40 Marks)** (Reading :Two long domain-specific comprehension passages with questions pertaining to understanding and analysis – 20 Marks) (Writing: Descriptive/narrative/persuasive writing questions pertaining to domain-specific vocabulary – 20 Marks)

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	S	S	M	M	M	S	M	S	S	S	S
CO 2	S	S	S	M	M	M	S	M	S	S	S	M
CO 3	S	S	S	S	M	M	S	M	S	S	S	M
CO 4	S	S	S	S	M	M	S	M	S	S	M	M
CO 5	S	S	S	S	M	M	S	S	S	S	S	S

S - Strong, M - Medium, L - Low

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Sem.	Course Code	Core IV: Tools and Techniques in Biochemistry	Total Marks: 100		Hours / Week	Credits
II	21UAPCT202		CIA: 50	ESE: 50	4	4

Course Objectives:

- The course will help students to acquaint with basic instrumentation, principle and procedure of various sophisticated instruments
- To get a comprehensive overview of the principles and applications of the instruments.
- This will enable the students to implement the use of these techniques in biological research and in discovering new products.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Discuss the features of various biochemical tools	K1 - K4
CO 2	Distinguish the principles of different biochemical techniques	
CO 3	Determine the protocols involved in the techniques of chromatography, electrophoresis and centrifugation.	
CO 4	Focus the applications of analytical techniques and biomedical equipments	
CO 5	Memorize the working procedure of instruments used in biochemistry laboratory	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I pH Meter and Buffer Systems

pH meter: Principle, Types of Electrode - Glass Electrode, Reference Electrode; pH scale; Henderson-Hasselbalch equation.

Buffer: Buffer solutions, Buffer systems of Blood - Bicarbonate, Phosphate and Hemoglobin Buffer system.

Various ways of expressing and conversion of concentration of solutions: Molality, Molarity, Normality, Mole fraction, Percentage Solution (v/v, w/v). Simple problems to be worked out.

Unit - II Chromatography

Chromatography: Principle, Techniques and Applications of Paper, Thin layer, Ion-exchange, Affinity, Gel Permeation, Adsorption chromatography.

Principle, Instrumentation and Applications of GLC and HPLC.

Unit - III Electrophoresis and Centrifugation

Electrophoresis: Principle, Techniques and Applications of Agarose gel electrophoresis, SDS-PAGE, Isoelectric focusing, Immunoelectrophoresis.

Centrifugation: Basic Principle, Types of centrifuge - Bench top, High speed.

Ultra centrifuge: Preparative Centrifugation - Differential and Density Gradient for Separation of Cell Organelles. Analytical Centrifugation - Principle, Instrumentation and Applications - Determination of Molecular weight by Sedimentation velocity method

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Unit - IV	Spectrophotometer and Biomedical Instruments

Spectrophotometer: Beer Lambert's Law, Types - Difference between Single beam and Double beam spectrophotometer. Principle, Instrumentation and Applications of Colorimeter, UV and Visible Spectrophotometer, Fluorimeter and Flame photometry.

Biomedical Instruments: Principle and Applications of ECG, EEG, CT Scan, Doppler, MRI Scan.

Unit - V	Tracer Techniques and Immunochemical techniques

Tracer Techniques: Radio isotopes - Penetrating ability, Types of Radioactive decay, Units of Radioactivity.

Detection and Measurement of Radioactivity: Principle, Techniques and Applications of GM counter, Scintillation counter, Autoradiography. Applications of Radio isotopes.

Immunochemical techniques: Principle, Technique and Applications of Radio Immuno Assay (RIA) and Fluorescent Immuno Assay (FIA).

Skill Development Activities	Max. Marks (10)
Assignment	3
Quiz	3
Group Discussion	3
Punctuality	1

	TEXT BOOKS
1	B. K. Sharma, Instrumental method of chemical analysis, Krishna Prakashan Media (P) Ltd., 1st edition, 2014
2	Dr. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies, 2002
3	A. Upadhyay, K. Upadhyay and N. Nath, Biophysical Chemistry - Principles and Techniques, Himalaya Publishing House Pvt. Ltd, 4th Edition, 2016
	REFERENCE BOOKS
1	Kudesia V.P. Sawhaney H, Instrumental method of chemical analysis, 1989
2	Plummer, D. T, An Introduction to Practical Biochemistry, McGraw Hill Education, 3rd Edition, 2001
3	Keith Wilson and John Walker, Practical Biochemistry, Principles and Techniques, Cambridge University Press, 2nd Edition, 2000
4	Mohammad Rafiq, Asima Hamid, Gulzar Ahmad, Analytical Biochemistry, Book Enclave, 1st Edition, 2019

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WEB RESOURCES	
1	https://epgp.inflibnet.ac.in/
2	https://www.biologydiscussion.com/biochemistry/top-6-tools-of-biochemistry-their-principles-and-applications/11135
3	http://ecoursesonline.iasri.res.in/course/view.php?id=282

Course Designed By	Verified By	Approved By HOD
Mr. G. KARTHIKEYAN	Mrs. T. RADHA	Dr. A. K.VIDYA

QUESTION PAPER PATTERN

Time: 3 hours		Max. Marks: 50
SECTION-A (10 X 1 = 10 Marks) Answer ALL questions Choose the correct answer Two questions from each unit	SECTION-B (5 X 3 = 15 Marks) Answer ALL questions Either or type Two questions from each unit	SECTION - C (5 X 5 = 25 Marks) Answer ALL questions Either or type Two questions from each unit

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	S	S	S	M	M	S	S
CO 2	M	S	M	M	M	S	S	S	M	S	S	S
CO 3	S	M	M	M	S	S	S	S	M	S	S	S
CO 4	S	M	M	M	S	S	S	S	S	S	S	S
CO 5	S	M	M	M	S	S	S	S	M	M	S	S

S - Strong, M - Medium, L - Low

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Sem.	Course Code	Allied II: Chemistry - II	Total Marks: 75		Hours / Week	Credits
II	21UAPAT204		CIA: 30	ESE: 45	4	3

Course Objectives:

- To understand the concepts of metallurgy
- To know the structural elucidation of Coordination compounds
- To obtain the knowledge about chemistry of Aromatic compounds, Thermodynamics and Electrochemistry.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Identify the basic concepts of organic and inorganic chemistry.	K1 - K4
CO 2	Summarize the fundamentals of physical chemistry	
CO 3	Describe the theories of coordination compounds and laws of thermodynamics.	
CO 4	Develop basic knowledge with the synthesis of organic compounds	
CO 5	Recall the properties of organic compounds and extraction method of different metals	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Metallurgy

Definition of Ores and its types, Mineral, Mining, Flux, Slag and Poling.

General methods of extraction of metals: Ore dressing (Physical and Chemical), Reduction methods, Refining methods - Zone refining and Van Arkel Zones refining. Extraction process of Uranium.

Furnaces: Blast and Reverberatory furnaces.

Unit - II Coordination Chemistry

Definition of Complex ion, Central ion, Ligand, Coordination bond, Coordination number, Coordination sphere, Chelate complex, Unidentate and Bidentate Ligands. Nomenclature of Mononuclear complexes.

Theories: Werner, Sidge Wick Effective Atomic Number and Pauling's Valence bond theory.

Chelation: EDTA - Structure and uses, Determination of Hardness of water using EDTA, Structure of Hemoglobin and Chlorophyll.

Unit - III Aromatic and Heterocyclic Compounds

Aromatic Compounds: Definition of Aromaticity, Huckel's rule. Mechanism of Nitration, Halogenation, Alkylation, Acylation and Sulphonation.

Naphthalene: Structural elucidation, Preparation, Properties and Uses.

Heterocyclic Compounds: Preparation and Properties of Pyrrole and Furan.

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Unit - IV	Energetics
Energetics: System (Open, Closed & Isolated), Surroundings, Difference between the Reversible, Irreversible process and Comparison of Isothermal and Adiabatic Process. First law of Thermodynamics (Definition only), Carnot cycle, Carnot theorem, Joule Thomson Effect, Definitions of Enthalpy, Bond energy, Entropy, Free energy	

Unit - V	Electrochemistry and Phase rule
Electrochemistry: Kohlraush's law and its application. Conductometric titration. pH determination - Galvanic cells, EMF Standard electrode potentials, Reference electrodes (Calomel Electrode). Electrochemical series and its applications. Principles of Electroplating. **Phase Rule:** Definition of terms in Phase rule. Study of a simple Eutectic system: Pb-Ag.	

Skill Development Activities
1. Poster presentation on Chemistry in everyday life 2. Chart preparation for the reaction mechanism 3. Report writing on the process involved in the extraction of metals from ores.

TEXT BOOKS	
1	R. D. Madan, Advanced Inorganic Chemistry, S. Chand & Company, 5th Edition, 2005
2	B. S. Bahl and Arun Bahl, Advanced Organic Chemistry, S. Chand and Company Ltd, 1st Edition, 2017
3	B. S. Bahl, G. D. Tuli and Arun Bahl, Essential of Physical Chemistry, S. Chand and Company Ltd, 3rd Edition, 2007
4	Dr. V. Veeraiyan, Allied Chemistry Paper I & II, 2nd Edition, HpH publications, Chennai
5	Dr. S. Rajan, Manual for Medical Laboratory Technology, 1st edition, Anjanaa Book House, Chennai, 2012
REFERENCE BOOKS	
1	B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, 33rd Edition, Vishal Publication, 2017
2	B. R. Puri, L.R. Sharma and Madan S.P athania, Elements of Physical chemistry, 30th Edition, Vishal Publication, 2017
3	R.Gopalan, Analytical chemistry: S.Chand& Co., 2007.
WEB RESOURCES	
1	https://epgp.inflibnet.ac.in/
2	http://chemed.chem.purdue.edu/genchem/beginners.html

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Course Designed By	Verified By	Approved By HOD
Mr. G. KARTHIKEYAN	Mr. R. RASU	Dr. A. K.VIDYA

QUESTION PAPER PATTERN		
Time: 3 hours		Max. Marks: 45
SECTION-A (5 X 1 = 5 Marks) Answer ALL questions Choose the correct answer Two questions from each unit	SECTION-B (5 X 3 = 15 Marks) Answer ALL questions Either or type Two questions from each unit	SECTION - C (5 X 5 = 25 Marks) Answer ALL questions Either or type Two questions from each unit

Mapping of COs with POs and PSOs:

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	S	M	M	M	M	S	S	M	M	S	S
CO 2	M	S	M	M	M	M	S	S	S	M	S	S
CO 3	M	S	M	M	M	M	S	S	M	M	S	S
CO 4	M	S	M	M	M	S	S	S	S	M	S	S
CO 5	S	S	M	M	S	M	S	S	M	S	S	S

S - Strong, M - Medium, L - Low

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPCT301	Title: CORE IV - ENZYME AND ENZYME TECHNOLOGY	Batch:	2019 -2020 Onwards
			Semester:	III
Hours/Week:	4		Credits:	4

Objectives

To enable the students to acquire knowledge about

- Techniques of isolation and purification of the enzymes
- Kinetics of the enzymes
- Applications of Enzymes in medicine and industry
- The current status and perspective of enzyme technologies

Course Outcomes

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

K1	CO1	Describe structure, characteristics and functions of enzymes
K2	CO2	Learn kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process.
K3	CO3	Acquire knowledge on mechanism of action of enzymes
K4	CO4	Understand design of bioreactors and apply principles of bioprocess to the industrial production of enzymes
K5	CO5	Gain exposure to wide applications of enzymes that can benefit human life and their future potential

Syllabus

Unit	Content	Hours
I	**Introduction to Enzymes** Definition, International Classification of enzymes, Numbering and Nomenclature. Definition of Active site, Theories proposed – Lock and Key or template model and Induced Fit Model, Ordered and Random Binding of substrate. Enzyme specificity – Absolute Specificity, Group specificity, Optical specificity, Reaction specificity. Extraction, Purification and Characterization of Crude Enzymes (Brief Description). Criteria of purity. Unit of enzyme activity - Definition and Importance.	10
II	**Enzyme Kinetics and Enzyme Inhibitors** **Enzyme Kinetics**: Derivation of Michaelis-Menten equation, Transformation of MM equation - Line-Weaver Burk plot and Eadie-Hoffste plot. Effect of pH, Temperature, and Substrate Concentration on Enzyme activity. Turn over number of enzymes. **Enzyme Inhibition:** Irreversible Inhibitors and Reversible Inhibitors - Competitive, Non-Competitive and Un-Competitive inhibition. Regulatory enzymes, Allosteric enzymes with reference to Aspartate Transcarbamoylase. **Isoenzymes**: LDH. Antioxidant enzymes.	8
III	**Coenzymes** - Definition, Structure and functions of TPP, NAD, Flavoproteins (FAD and FMN), Coenzyme A, Metal cofactors. **Multi Enzyme Complex**: Pyruvate dehydrogenase complex.	8

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	Mechanism of enzyme action: General acid base catalysis, Covalent catalysis, Proximity orientation. Mechanism of action of Lysozyme and Chymotrypsin.	
IV	**Enzyme Technology** **Immobilized Enzymes:** Source and techniques of immobilization- Adsorption, Covalent binding, Entrapment, Encapsulation. **Design of Immobilized Enzyme Reactors:** Stirred tank reactors (STR), Packed -bed reactors (PBR), Fluidized -bed reactors (FBR); Membrane reactors (Brief description only) **Industrial Production of Enzymes:** Amylase, Proteases, Pectinases and their applications.	9
V	**Enzyme engineering and applications** **Uses of Enzymes in analysis**: Enzymes as Biosensors - Calorimetric biosensors, Optical biosensors and Immunosensors (Principle, technique, mechanism and examples). Future prospects of Enzyme Engineering. Artificial enzymes. **Industrial uses of enzymes:** Application of enzymes in Leather, Textile, Food, Detergent and Paper industry. **Clinical uses of enzymes**: Enzymes used in diagnosis and various diseases with normal and abnormal values. Therapeutic application of enzymes.	9
	TOTAL	**44**

Teaching Methodology:
Chalk and Talk PPT, Model Presentation, Demonstration, Field visit.

Books for Study:

1. Trevor Palmer (1995). Understanding enzymes. 3rd edition, Prentice hall Limited.
2. Trevor Palmer, P L Bonner (2008). Enzymes Biochemistry. Biotechnology and Clinical Chemistry, 2nd Edition, Wood Head Publishing.
3. Weisman (1985). Handbook of Enzyme technology.3 rd Edition, Prentice Hall.
4. N Gray; M Calvin and S C Bhatia (2010). Enzymes Biotechnology, Published by CBS Pub, New Delhi, 2010

Books for Reference:

1. Chapline and Bucke (1990). Enzyme technology. 2 nd edition, Cambridge University Press.
2. Albert L. Lehninger, Michael M. Cox, David L. Nelson (2017). Lehninger's Principles of Biochemistry. 6 thed, Mc Millan Worth.
3. Nicholas C. Price and Lewis Stevens (2009). Fundamentals of Enzymology. 3rd edition, Oxford Press.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. A. K. Vidya Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPCT302	Title: CORE V - MICROBIOLOGY	Batch:	2019 -2020 Onwards
			Semester:	III
Hours/Week:	3		Credits:	3

Objectives

- To define the science of microbiology and describe some of the general methods used in the study of microorganisms.
- To discuss the historical concept of spontaneous generation and the experiments that was performed to disprove this erroneous idea
- To establish the causal link between a suspected microorganism and disease.
- To learn the various activities of microorganisms that is beneficial to humans.

Course Outcomes

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

K1	CO1	Know the principal areas of the Microbiology like microbial physiology (Bacteria, Fungi & Algae).
K2	CO2	Acquire the basic concepts to operate the different varieties of Microscopes and methods of Sterilization.
K3	CO3	Develop basic skills necessary to work with microbial cultures in Microbiological Laboratory.
K4	CO4	Explain the basic genetic systems of Virus and Bacteriophage.
K5	CO5	Understanding of the normal and common pathogenic organisms associated with human infectious diseases and the role of microbes in fermentation process.

Syllabus

Unit	Content	Hours
I	**Microbiology Overview** **Prokaryotes:** General Morphology and Sub cellular structures of Bacteria, Bacterial reproduction - Vegetative, Asexual and Sexual **Microbial Growth:** Bacterial Growth curve and Generation time. **Eukaryotes:** Morphological characteristics and Importance of Algae. Structural Characteristics, Reproduction and Importance of Fungi.	6
II	**Sterilization:** Definition, Types – Autoclave, Pasteurization. Methods of Sterilization (dry heat, moist heat, filtration, radiation, Tyndallization), Chemical Sterilization (Phenol, Detergents, Aldehydes, and Gaseous agents). **Microscopy:** Light microscopy – Bright Field, Dark field, Fluorescent and Phase Contrast. Electron Microscopy - SEM and TEM (Principle and Applications).	7
III	**Culture Media:** Types, Culture Media - Selective and Enrichment media. Culture methods – Batch and Continuous culture. **Isolation and Maintenance of Microorganisms:** Pure Culture - Definition, Methods of Pure Culture - Serial Dilution technique, Pour Plate, Spread Plate, Streak Plate. Maintenance of Pure Culture. **Staining techniques:** Principle and technique of Simple, Negative, Differential (Gram, Acid fast and Endospore staining) and Fungal staining (Lactophenol Cotton Blue).	

IV	**Viruses:** General characteristics and structure of Virus. Plaque assay. **Bacteriophage:** Structure and Life cycle (Lytic cycle) of T4 Phages and Lambda Phages (Lytic and Lysogenic cycle). **DNA Virus:** Adeno virus - Morphology and pathophysiology. **RNA Virus:** SARBECO Family - Morphology and pathophysiology.	6
V	**Microbial Diseases in Humans:** Normal human micro flora; Host - Parasitic interaction; Epidemics, Intoxications – Types. **Air borne Diseases:** Tuberculosis, Influenza and Aspergillosis. **Water borne Diseases:** Typhoid and Hepatitis. **Food borne Diseases:** Botulism and Salmonellosis. **Direct contact Disease:** Rabies. **Microbiology of Water:** Bacteriological examination of water; Sewage and its treatment; Purification of drinking water. **Industrial Microbiology:** Microorganisms involved in fermentation processes (Alcoholic and Lactic acid fermentation).	7
	TOTAL	**33**

Teaching Methodology:
Chalk and Talk, PPT, Demonstration

Books for Study:

1. E.C.S. Chan, Michael J. Pelczar, Jr.,Noel R. Krieg, Microbiology, 5th Edition, MC Graw Hill Book Company, 1998.
2. Gerard J. Tortora, Berdell R. Funke and Christine L. Cas, Microbiology - An Introduction, 13th Edition, 2020.
3. Prescott L M, Harley J H and Klein D A, Microbiology, 7th Edition, C. Brown Publishers, 2007.

Books for Reference:

1. Ronald M. Atlas, Microbiology-Fundamentals and Applications, 2nd Edition, Macmillan Publishing Company, New York, 1998.
2. Ananthanarayanan. R. and Yayaraman Panikar, Text book of Microbiology, 10th Edition. Universities Press, 2017.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: S. Natarajan Signature:	Name: R. Rasu Signature:	Name: T. Radha Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPCP402	Title: CORE BIOCHEMISTRY PRACTICALS - II	Batch:	2019 -2020 Onwards
			Semester:	III & IV
Hours/Week:	2 (ODD) & 3 (EVEN)		Credits:	3

(EXAMINATION AT THE END OF FOURTH SEMESTER)

Objectives

- To understand and get familiarized with the Microbial, Enzymological and Nutritional experiments.

Course Outcomes

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

K1	CO1	Know the media preparation and pure culture techniques
K2	CO2	Differentiate the microorganisms using staining techniques
K3	CO3	Get familiarized with the assay of enzyme kinetics.
K4	CO4	Acquire knowledge ofnutritional content in food samples
K5	CO5	Understand the protocol for determination of lipids and bioactive compound

Syllabus

Unit	Content	Hours
I	**MICROBIOLOGY EXPERIMENTS** **1. Media preparation (Group)** Preparation of Culture Media: Nutrient Agar, Nutrient Broth, Potato Dextrose Agar. Serial Dilution Technique & Pure Culture Techniques: Pour Plate, Spread Plate and Streak Plate Methods	6
II	**2. Staining Techniques** Simple staining Gram staining Endospore staining Negative staining Fungal staining	6
III	**ENZYMES KINETIC STUDIES - Salivary Amylase / Catalase assay** (Group Experiment) Effect of pH on enzyme activity. Effect of Temperature on enzyme activity. Effect of Substrate Concentration on enzyme activity. Effect of Enzyme concentration.	8

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IV	**Estimation of Nutritional Content in Food Samples** Estimation of Iron from Plant source by Wong's method Estimation of Fructose from Fruits by Seliwanoff method Estimation of Ascorbic acid (Vitamin C) from Citrus Fruits by Dye Method Estimation of Calcium in Milk Determination of Casein from Milk	15
V	**Demonstration Experiments** Isolation of Lecithin from Egg Yolk Estimation of Oil in Oil seeds Determination of Caffeine from Tea leaves	9
	TOTAL	**49**

Teaching Methodology:
Demonstration following individual Practicals

Books for Study:

1. Sashidhar Rao B and Deshpande V, Experimental Biochemistry: A Student companion, IK International (P) Ltd Publications, 2005.
2. Dr. N. Kannan, Laboratory Manual in General Microbiology, Panima Publishing Corporation, 2002.

Books for Reference:

1. Boyer R, Modern Experimental Biochemistry, 3rd Edition, Pearson Education, 2001.
2. Sadasivam S and Manickam A, Biochemical Methods, 3rd Edition, New Age International Publishers, 2018.
3. Plummer, D. T. Tata, An Introduction to Practical Biochemistry, 3rd Edition, McGraw Hill, 2006.
4. Sawhney, S. K. Randhir Singh, Introductory Practical Biochemistry, 2nd Updated Edition, Alpha Science, 2005.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. A. K. Vidya Signature:	Name: S. Natarajan Signature:	Name: R. Rasu Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	17UAPAT303	Title: ALLIED III - BIOMATHEMATICS	Batch:	2019 -2020 Onwards
			Semester:	III
Hours/Week:	4		Credits:	3

Objectives

- To enable the students to understand the concepts of Mathematical and Statistical results and to develop sufficient knowledge to apply in their further studies.

Course Outcomes

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

K1	CO1	Apply the concepts of binomial and exponential theorems in summation of series.
K2	CO2	Solve the problems using Matrices.
K3	CO3	Describe different types, collection and presentation of data.
K4	CO4	Determine the measures of central tendency and dispersion.
K5	CO5	Apply Correlation and Regression in statistical analysis.

Syllabus

Unit	Content	Hours
I	Binomial and Exponential theorems (Statement only) -Application to summation of series – Simple Problems.	8
II	Matrices – Types of Matrix – Operations – Matrix Multiplication - Inverse of a matrix- Rank of Matrix –Linear Equations by Matrix method – Simple Problems	9
III	Statistics: Meaning and Scope- -Collection of Data-Primary and Secondary data - Methods of collecting Primary and Secondary Data-Classification and Tabulation- Presentation of data by Diagrams-Bar diagram and Pie diagram - Graphic Representation of Frequency Distribution.	9
IV	Measures of Central Tendency: Mean, Median and Mode - Geometric Mean and Harmonic Mean (simple problems only). Measures of Dispersion: Range, Quartile Deviation, Standard Deviation and Co-efficient of Variation.	9
V	Correlation: Meaning–Scatter Diagram-Karl Pearson's Co-efficient of Correlation- Spearman's Rank Correlation. Regression Analysis: Meaning of Regression–Regression in Two Variables- Difference between Correlation and Regression.	9
	TOTAL	44

Teaching Methodology: Chalk and Talk, PPT

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Books for Study:

1. P.Kandasamy and K.Thilagavathi. "Allied Mathematics", Paper- I First Semester. S.Chand and Company Ltd. New Delhi.2003.
   UNIT I: Pages 8-27 UNIT II: Pages 72-106
2. P.A Navnitham. "Business Mathematics & Statistics", Jai Publishers, Trichy,2011.
   UNIT III Chapter 1, 3, 5, 6: Pages 1 – 5, 9-17, 28-39,61-64, 83-91, 99-119, 131-146
   UNIT IV Chapter 7, 8: Pages 159- 183, 196-209, 212-227, 251-260, 301 -310, 325-340
   UNIT V Chapter 12, 13: Pages 503-508, 518-522, 540-554, 563-569

Books for Reference:

1. R.S.N.Pillai and Bagavathi, "Statistics theory and practice", Jai Publishers, Trichy 21, 2013.
2. P.R.Vittal, "Allied Mathematics", Margam Publications, Chennai, 2002.
3. Jerrold H.Zar, "Biostatistical Analysis", Pearson Education, 4th Edition, 1999.
4. S.Prasad, "Elements of Biostatistics", Rastogi publications, Meerut, 2005.
5. P.Raja, "Mathematics and Biostatistics", Subash Publications, 1999.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Mrs. M. Kalaivani Signature:	Name: Mr. S. Suresh Signature:	Name: Dr. S. Nagarajan Signature:	Name: Dr. Nagarajan Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPST304	Title: SKILL BASED COURSE I - NUTRITIONAL BIOCHEMISTRY	Batch:	2019 -2020 Onwards
			Semester:	III
Hours/Week:	3		Credits:	3

Objectives

- To acquire knowledge of various concepts of nutrition – facts and principles
- To inculcate students for healthy attitudes
- Update knowledge about essential nutrients

Course Outcomes

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

K1	CO1	Acquire detailed knowledge regarding the biological basis of nutrition.
K2	CO2	Develop laboratory skills required for a modern biochemical study of nutrition includes the quantitative analysis and interpretation of results.
K3	CO3	Attain the mechanisms by which diet can influence our health.
K4	CO4	Integrate biochemical mechanisms with disease pathology and clinical treatment options.
K5	CO5	Gain the principles, knowledge and application of integrative nutrition in the areas of whole foods & food as a medicine.

Syllabus

Unit	Content	Hours
I	**Nutrient and Health** – Definition of Food and Nutrition. Classification of Food groups: Nutritional importance of Carbohydrates, Fibers, Proteins and Fats. Source and Functions of Vitamins and Minerals – An overview. **Water:** Distribution of water in body, Factors influencing distribution, Physiological functions of water. **Electrolytes:** Sodium, Potassium and Chloride. Acid - Base Balance and its regulation in human body.	7
II	**Energy:** Definition of Energy, Kilocalories, Joule, Biological value, NPU, Digestibility coefficient, PER, RDA, Balanced diet. Calorific Value of foods. Thermogenic effects (SDA) of food. BMR – Definition, measurement and factors affecting BMR. Nutrigenetics and Nutrigenomics (Definition and Application only)	7
III	**Functional foods** Probiotics – Definition, Types, Mechanism of Action, Applications and Commercial Probiotics. Prebiotics - Definition, Sources and Functions.	6

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IV	Therapeutic diets for Anemia, Cardiovascular diseases, Diabetes Mellitus, Cancer, Covid disease (WHO Norms). **Disorders related to Nutrition**: Protein Malnutrition, Obesity and Starvation. **Nutritional disorders of the Nervous system**: Burning feet syndrome, Spinal ataxia. **Nutritional disorders of Skin**: Follicular hyperkeratosis, Xeroderma. **Nutritional disorders of Eye**: Night Blindness, Bitot's Spot. **Nutritional disorders of Mouth**: Nutritional glossitis, Parotid gland enlargement.	7
V	**Naturally occurring Antioxidants:** Walnuts, Broccoli and Tomatoes. **Nutrient loss:** Loss of nutrients during processing and cooking. **Naturally occurring toxicants:** Toxicants from pathogenic Microorganisms, Contamination of foods with toxic chemicals and pesticides. **Food Allergy:** Definition, Food as Allergens – Types, Symptoms, Diagnosis and Treatment.	6
	TOTAL	**33**

Teaching Methodology:
Chalk and Talk& PPT

Books for Study:

1. A.C. Deb, Fundamentals of Biochemistry, 7th Edition, New Central Book Agency (P) Ltd, 2001.
2. Tom Brody, Nutritional Biochemistry, 2nd Edition, Elsevier Publishers, 1999.
3. Satyanaryana U, Biochemistry, 4thRevised Edition, Books and Allied (P) Ltd, 2013.

Books for Reference:

1. Staci Nix, William's Basic Nutrition and Diet Therapy, 12thEdition, Elsevier Publishers, 2005.
2. Mahan L. K, Stump S.E, Food, Nutrition and Diet Therapy, 9th Edition, W. B. Saunders Company, 2006.
3. B. Srilakshmi, Diabetes, 5th Edition, New Age International (P) Limited Publishers, 2005.
4. S. Ramakrishnan, S.VenkatRao, Nutritional Biochemistry, 1st Edition, T.R. Publications, 1995.
5. Macdonald & Rock, Nutrition and Metabolism, 2ndEdition, Blackwell Publishing, 2004.

Course Designed by	Verified by	Checked by	Approved by
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Name: Dr. N. Sangeetha Signature:	Name: R. Rasu Signature:	Name: T. Radha Signature:	Name: Dr. A. K. Vidya Signature:

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Sem.	Course Code	Non-Major Elective - I:	Total Marks:75		Hours Per Week	Credits
III	19UAKNT306	Internet Principles	CIA :-	ESE :75	2	2

OBJECTIVE:

To enable the Students understand the Basic Terminologies and Concepts of the Internet.

COURSE OUTCOMES:

At the end of the course, the students willable to

CO1: Understand the basics of Internet (Understand)

CO2: Discuss Create, sending and Receiving mails (Understand)

CO3: Acquire knowledge in the basics of internet and its function (Apply)

CO4: Recognize the IP address and Domain name (Remember)

CO5: Compare the different types of Protocols (Analyze)

UNIT - I

Basics of Internet: Introduction – What is Internet – Evolution of Internet – Using the Internet - Search Engines-Mailing List.

UNIT- II

E-Mail Basics: E-Mail Addresses - Sending Mail - Sending Copies of a Message - Reading Mail - Replying to a Message - Forwarding and Bouncing Mail.

UNIT- III

World Wide Web (WWW): Introduction – Web page - Netsurfing. Browsers: Introduction- Internet Explorer - Netscape Navigator - Lynx.

UNIT- IV

Internet Addressing: Introduction - What is Internet Addressing - IP Address - Domain Name - Pseudo – Internet Addresses – Signature - Uniform Resource Locator (URL).

UNIT- V

Internet Protocols: Transmission Control Protocol / Internet Protocol (TCP/IP) - File Transfer Protocol (FTP) - Hyper Text Transfer Protocol (HTTP) – Telnet – Gopher – Pseudo – Internet addresses - Signatures.

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TEXT BOOKS:

1. Harley Hahn–The Internet Complete Reference - Second Edition - Tata Mc-GRAW-HILL Publication-2006 *(Unit I and Unit II)*

2. Alexis Leon, Mathews Leon–Internet for Everyone- First Edition - Vikas Publishing House Pvt Ltd 1998*(Unit III, Unit IV and Unit V)*

REFERENCE BOOKS:

1. Bennett Falk–TheInternetBasicReferencefromAtoZ–SecondEdition-BPBPublications-1996.

2. Christian Crumlish - The Internet NoExperienceRequired-SecondEdition-BPBPublications-1999

3. Joshua Eddings - How the Internet Works-Ziff Davis Press-1999

4. Marcus Goncalves, Arthur Donker, Kathryn Toyer, Matthew Willis, Kitty Niles, AnneHart and Jon-Paul Harkin-Internet Privacy Kit - Que Corporation -1997

5. NIIT - Internetworking Infrastructure and Operations – Second Edition – Prentice – Hall of India (P) Ltd - 2004.

Question Paper Pattern
SECTION–A
Five Questions
(Either or Choice)
Two Questions from each unit
(5 x 15 = 75 Marks)

HEAD OF THE DEPARTMENT
DEPARTMENT OF COMPUTER SCIENCE (UG)
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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPCT401	Title: CORE VI - INTERMEDIARY METABOLISM	Batch:	2019 -2020 Onwards
			Semester:	IV
Hours/Week:	4		Credits:	5

Objectives

To enable the students to learn and understand

- The basic functions, principles and concepts of metabolism
- Principles of Bioenergetics
- Integration of Metabolic Pathways -Carbohydrate, fat and protein metabolism that takes place in our body.

Course Outcomes

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

K1	CO1	Understand the fundamental energetics of biochemical processes
K2	CO2	Integrate knowledge on how the bodymetabolizes glucose and advanced understanding of how the body produces and stores energy.
K3	CO3	Understand lipid metabolism and the role of lipids in the formation of metabolites.
K4	CO4	Learn the different process of anabolism and catabolism of Proteins
K5	CO5	Comprehend the role of purine and pyrimidine in nucleic acid metabolism.

Syllabus

Unit	Content	Hours
I	**Bioenergetics** The Basic metabolic pathways, Anabolic, Catabolic and Amphibolic Pathways. **Free energy and the Laws of Thermodynamics**; Role of High Energy Compounds as Energy Currency of the cell; Free Energy of hydrolysis of ATP and other Organophosphates. **Electron Transport Chain**: - Role of Respiratory chain in Mitochondria. **Oxidative Phosphorylation**: - Mechanism of Oxidative Phosphorylation; Chemiosmotic theory; Uncouplers of Oxidative Phosphorylation, Difference between Substrate level and Oxidative Phosphorylation with examples.	6
II	**Carbohydrate Metabolism** Fate of absorbed Carbohydrates. Glycolysis: - Pathways and Energetics; Oxidation of Pyruvate to Acetyl CoA. TCA Cycle: - Pathway and Energetics; Anaplerotic reaction. Gluconeogenesis; Glycogenesis and Glycogenolysis. Pentose Phosphate Pathway (HMP Shunt). Glyoxylate cycle. Metabolism of other Hexoses: - Fructose and Galactose	10

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III	**Lipid Metabolism** Blood lipids and Fate of Dietary Lipids. **Oxidation of Fatty acids**: Carnitine cycle; Beta Oxidation. Oxidation of Fatty acid with Odd numbered Carbon atoms. Alpha Oxidation and Omega Oxidation. **Biosynthesis of Saturated Fatty acids**: De novo biosynthesis of Fatty acids (With reference to Palmitoyl CoA). **Biosynthesis of Phospholipids**: Lecithin, Cephalin, Inositol, Phosphatidyl Serine, **Biosynthesis of Cholesterol**.	8
IV	**Protein Metabolism** Fate of Dietary Proteins, Metabolic Nitrogen Pool. **Catabolism of Amino acid:** Transamination, Oxidative Deamination, Non - Oxidative Deamination, Amino acid Decarboxylation. Glucogenic amino acid degradation - Glycine, Glutamine. Ketogenic amino acid degradation - Phenylalanine, Tyrosine. Nitrogen excretion and Urea cycle. Gamma Glutamyl cycle.	6
V	**Nucleic acid Metabolism** **Metabolism of Purines**: De novo synthesis, Salvage pathways; Catabolism. **Metabolism of Pyrmidines:** De novo synthesis, Salvage pathways; Catabolism. Interrelation between Carbohydrates, Lipid and Protein Metabolism.	6
	TOTAL	**36**

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. Robert K. Murray, Peter A. Mayes, Victor W. Rodwell, Harper's Illustrated Biochemistry, 30th Edition, McGraw-Hill Education, 2015.
2. Donald Voet, Judith G. Voet, Biochemistry, 4th Edition, John Wiley and Sons, 2010.

Books for Reference:

1. Lehninger, L.S., *et al*., Principles of Biochemistry, 7th Edition, CBS Publishers, 2012.
2. Harry R. Matthews, Richard A. Freedland, Roger L. Miesfeld, and Biochemistry - a short course, 1st Edition, Wiley & sons.1997.
3. Garrett and Grisham, Biochemistry, 5th Edition, Saunders College Publishers, 2012.
4. Donald Voet, Judith G. Voet, Charlotte W. Pratt, Fundamentals of Biochemistry: Life at the Molecular Level, 5th Edition, Wiley Publishers, 2016.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. A. K. Vidya Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc		Biochemistry
Course Code:	17UAPAT403	Title: ALLIED IV - COMPUTER AND INFORMATION TECHNOLOGY	Batch:	2019 -2020 Onwards
			Semester:	IV
Hours/Week:	4		Credits:	3

Objectives

- To impart the knowledge about Windows XP and the features of MS-Office2007.

Course Outcomes

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

K1	CO1	Describe the features and components of windows XP
K2	CO2	Perform documentation with various formatting in MS-Word 2007
K3	CO3	Compute calculations and generate charts in MS-Excel 2007
K4	CO4	Illustrate the presentation skills in MS-PowerPoint 2007
K5	CO5	Create Database, Table, Query, Forms and Reports

Syllabus

Unit	Content	Hours
I	**Windows XP:** Introduction – Features of Windows XP - Getting started – working with windows – Start menu and the Task bar – Windows Explorer – Files and Folders – The control panel –Accessories.	7
II	**MS-Word2007:** Introduction – MS word 2007- Getting started with MS word2007 – Microsoft office button – Quick Access Toolbars – Working with documents – Page formatting – Macros.	7
III	**MS-Excel 2007:** Introduction – Getting started with MS Excel 2007 – Spreadsheets – Microsoft office button – Ribbon – Quick Access Toolbar – Creating a workbook – Data – Modifying a worksheet – Calculation – Relative, Absolute and Mixed references – Formatting Worksheet – Page properties and printing.	7
IV	**MS-PowerPoint 2007:** Introduction – MS PowerPoint 2007 - Getting started – Microsoft office button – Ribbon – Quick Access toolbar – Customize – Creating a presentation – Slide effects – Transition – Animation – Printing.	7
V	**MS-Access 2007:** Introduction – Microsoft office button – Navigation Pane – Tabbed document window viewing – Ribbon – Quick access toolbar – Customize – Database terms – Creating a new database – Create a table – Data types – Manage table – Primary keys – Managing data – Query a database – Query wizard – Create a form - Generating reports – Print a report.	8
	TOTAL	36

Teaching Methodology:
Chalk and Talk, PPT, Oral Presentation

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Books for Study:

1. Sanjay Saxena, A First Course in Computers Based on Windows and Office XP, Second Edition, 2010. (Unit – I)
2. Sanjay Saxena, MS- Office 2007 in a Nutsheli, Vikas Publishing House Pvt Ltd.,2011 (Unit – II, III, IV,V)

Books for Reference

1. Kogent Solutions Inc., Office 2007 in simple steps, Dreamtech publishing, 2009.
2. Joyce Cox, Cutris Frye, M. Dow Lambert III, Steve lambert, John Pierce, JoanPreppernau: 2007 Microsoft Office System Step by Step, PHI, Second edition,2010

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: S. karthikeyeni Signature:	Name: Dr. B. Jayanthi Signature:	Name: Dr. B. Jayanthi Signature:	Name: Dr. B. Jayanthi Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPAP404	Title: ALLIED PRACTICALS II - COMPUTER AND INFORMATION TECHNOLOGY LAB	Batch:	2019 -2020 Onwards
			Semester:	IV
Hours/Week:	2		Credits:	2

Objectives

- To impart the knowledge about MS-Office 2007

Course Outcomes

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

K1	CO1	Create letter heads, resume, timetable and mail merging of letters in MS-Word
K2	CO2	Prepare Student Mark list and generate Charts and Reports in MS-Excel
K3	CO3	Demonstrate presentation with simple and animated effects in MS-Power Point
K4	CO4	Database, Tables and Query in MS-Access
K5	CO5	Query, Forms and Reports in MS-Access

Syllabus

Unit	Content	Hours
I	**I. MS Word2007** 1. Create a Company letterhead 2. Prepare curriculum vitae 3. Generate Class time table using Table facilities 4. Create a letter to attend the interview using Mail merger	4
II	**II. MS Excel2007** 5. Create and analyze the students' marks using formulas and various charts. 6. Create a worksheet to manipulate various formatting options. 7. Create a report containing the pay details of the employee.	4
III	**III. MS Power Point 2007** 8. Create a simple presentation. 9. Imply different animation and transition effects in presentation.	2
IV	**IV. MS Access2007** 10. Creation of simple table and query 11. Creation a form to add, modify, delete records in a table	2
V	**IV. MS Access2007** 12. Create a table, queries and prepare reports to display the information	2
	TOTAL	**18**

Teaching Methodology:
Demonstration following Individual Practice

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Books for Study:

1. Sanjay Saxena, A First Course in Computers Based on Windows and Office XP, Second Edition, 2010. (Unit – I)
2. Sanjay Saxena, MS- Office 2007 in a Nutshell, Vikas Publishing House Pvt Ltd.,2011 (Unit – II, III, IV,V)

Books for Reference

1. Kogent Solutions Inc., Office 2007 in simple steps, Dreamtech publishing, 2009.
2. Joyce Cox, Cutris Frye, M. Dow Lambert III, Steve lambert, John Pierce, Joan Preppernau: 2007 Microsoft Office System Step by Step. PHI, Second edition,2010

Course Designed by	Verified by	Checked by	Approved by
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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPST405	Title: SKILL BASED COURSE II - NANOTECHNOLOGY AND CLINICAL TRIALS	Batch:	2019 -2020 Onwards
			Semester:	IV
Hours/Week:	3		Credits:	3

Objectives

- To understand and get familiarized with the fundamentals of Nanotechnology
- To give a general introduction to different classes of nanomaterials and impart basic knowledge on characterization techniques involved in Nanotechnology
- To make the learner familiarize with the applications of nanotechnology in various fields
- To identify key operational requirements, data management and regulatory affairs in clinical trials

Course Outcomes

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

K1	CO1	Gain the fundamentals of Nanotechnology and to get knowledge familiarize with the new concepts of Nano science and Technology.
K2	CO2	Ability to manipulate matter at molecular scale and attain the principal classes of biomaterials and their functionalities in modern medical science.
K3	CO3	Impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
K4	CO4	Acquire the outline interest of research about health care and study population.
K5	CO5	Attain general basics related to document development used in clinical trials.

Syllabus

Unit	Content	Hours
I	**Nanotechnology:** Introduction, Definition, Nanoscale. **Classification of Nanomaterials:** Based on Origin, Dimension and Structural configuration. **Applications:** Nanotechnology in Medicine, Textile, Food and Agriculture.	5
II	**Properties of Nanostructured Materials:** Size and Shape dependent properties – Colour, Optical properties, Electrical Conductivity, Magnetic properties, Thermal properties and Band Gap. **Nanomaterials:** Quantum Dots, Nanowires, Carbon-based Nanomaterials (CNTs), Metal based nanomaterials – Nanogold and Nanosilver, Metal oxide Nanoshells – Zirconia and Silica Nanoshells.	6
III	**Synthesis of Nanomaterials:** Top – Down (Ball Milling), Bottom – Up (Sol-Gel Processing), Chemical and Green synthesis of Nanoparticles. **Characterization of Nanophase materials:** XRD, FTIR, EDX, FESEM, FETEM	5

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IV	**Research Design and Overview of Clinical Trials:** Definition of Clinical Trial. Types of Clinical Trials. Planning and execution of Clinical trials - formulating research questions, Study population – Sample size determination. **Various Phases of Clinical trials:** Phase-I, Phase-II, Phase-III and Phase-IV trials.	6
V	**Documents in clinical study:** Essential Documents in Clinical Trial - Investigator Brochure (IB), Case Report Form (CRF), Good Clinical Practice: ICH Guidelines, ICMR Guidelines. **Clinical Trial Applications:** New Drug Application (NDA). Clinical Trial Applications in India.	5
	TOTAL	27

Teaching Methodology: Chalk and Talk, PPT, Oral Discussion, Demonstration

Books for Study:

1. Pradeep T, Nano: The Essentials Understanding Nanoscience and Nanotechnology, 1st Edition, Tata McGraw – Hill Publishing Company Limited, 2007.
2. Lakshman Desai, Nanotechnology, 1st Edition, Paragon International Publishers, 2007.
3. BhaskarMazumder, Nanotechnology: Therapeutic, Nutraceutical, and Cosmetic Advances, 1st Edition, CRC Press, 2019.

Books for Reference:

1. R Bruce Weisman, Handbook of Carbon Nanomaterials (Volumes 9-10) (World Scientific Carbon Nanoscience), 1st Edition, World Scientific Publishing Company, 2019.
2. Design and Analysis of Clinical Trials Concepts and Methodologies, Second Edition Shein-Chung Chow, Jen-Pei Liu, Wiley – Interscience, A John Wiley & Sons, Inc Publication

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name:Dr. N. Sangeetha Signature:	Name: G. Karthikeyan Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPAL407	Title: ADVANCED LEARNERS COURSE I - BIOPHYSICS	Batch:	2019 -2020 Onwards
			Semester:	IV
Hours/Week:	Self-Study		Credits:	2

Objectives

- To provide latest knowledge of medical assistance / techniques and therapeutic equipments.
- To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration.
- To introduce the student to the various sensing and measurement devices of electrical origin.
- To provide awareness of electrical safety of medical equipments.
- To bring out the important and modern methods of imaging techniques.

Course Outcomes

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

K1	CO1	Analyze and explain key concepts in biophysics.
K2	CO2	Prepare them to be competitive in pursing advanced studies or employment in medical, biotechnical & pharmaceutical fields.
K3	CO3	Provide broad foundation about various sensing and measurement machines in biomedical sciences.
K4	CO4	Learn methods of experimental physics.
K5	CO5	Acquire an idea about artificial organs and its function mimicking natural ones.

Syllabus

Unit	Content	Hours
I	**Electrophysiological Measurements: Electrodes** - Limb electrodes, Pregelled disposable electrodes, Micro, Needle and Surface electrodes. **Amplifiers:** Preamplifiers, Differential amplifiers and Chopper amplifiers. **Electrical safety in Medical environment:** Shock hazards, Safety parameters of biomedical equipments.	-
II	**Blood Flow Meters:** Electromagnetic blood flow meter, Ultrasonic blood flow meter, Doppler blood flow meter, NMR blood flow meter. **Blood Gas Analyzers:** Blood pH measurement, pCO2 and pO2 measurement. **Blood Pressure and Heart Sound Measurement:** Sphygmomanometer and Stethoscope **Blood Cell counters:** Coulter counters.	-

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III	**Pulmonary function analyzers:** Pulmonary function measurement (Principle and applications)-Pneumotachography, Spirometry, Respiratory gas analyzers, Respiratory rate meter, Pulse oximeter. **Endoscopy:** Introduction, various types of endoscopes - Laproscopes, Fiber optic endoscopes and Endoscopes with integral TV cameras. **Assisting and therapeutic equipments:** Pacemakers, Ventilators, Nerve and muscle stimulators, Heart-Lung machine, Audio meters.	-
IV	**Audiometry:** Air conduction, Bone conduction, Masking, Functional diagram of an audiometer. Hearing aids: Different types, Receiveramplifiers. **Radiation therapy:** Radiotherapy principles, Safety protocols and protection.	-
V	**Artificial Organs:** Introduction to artificial organs: Biomaterials used in artificial organs and prostheses. **Artificial kidney:** Brief of kidney filtration, basic methods of artificial waste removal, hemodialysis, equation for artificial kidney. Hemodialysers. **Artificial heart-lung machine:** Brief of lungs gaseous exchange / transport, artificial heart- lung devices. Oxygenators: bubble, film oxygenators and membrane oxygenators. **Artificial blood and skin.**	-
	TOTAL	**55**

Teaching Methodology: Self-Study

Books for Study:

1. R.S.Khandpur, Hand Book of Bio-Medical instrumentation, 2nd Edition, McGraw Hill Publishing CoLtd.2003.
2. Leslie Cromwell, Fred J.Weibell, Erich A. Pfeiffer, Bio-Medical Instrumentation and Measurements, 2nd Edition, Pearson Education, 2002.

Books for Reference:

1. M.Arumugam, Bio-Medical Instrumentation, Anuradha Agencies,2003.
2. L.A. Geddes and L.E. Baker, Principles of Applied Bio-Medical Instrumentation, John Wiley & Sons,1975.
3. J.Webster, 'Medical Instrumentation', John Wiley & Sons,1995.
4. C.Rajarao and S.K.Guha, Principles of Medical Electronics and Bio - medical instrumentation. Universities press (India) Ltd, Orient Longman ltd,2000.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. A. K. Vidya Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPAL408	Title: ADVANCED LEARNERS COURSE II - PHYTOCHEMISTRY AND PHYTOCHEMICAL TECHNIQUES	Batch:	2019 -2020 Onwards
			Semester:	IV
Hours/Week:	Self - Study		Credits:	2

Objectives

- Understand the structure and function of basic secondary metabolites in medicinal and aromatic plants.
- Familiarize with the common separation and characterization techniques used in phytochemistry.
- Understand the basic officinal part present in the common medicinal plants and their use in herbal drug formulations.
- Introduce the students into the herbal drug industry.

Course Outcomes

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

K1	CO1	Able to identify plant primary and secondary metabolites.
K2	CO2	Learn methods of experimental techniques of phytochemicals.
K3	CO3	Develop skill to qualitative analysis of plant constituents.
K4	CO4	Acquire knowledge on the skills of methods of separation of natural plant constituents.
K5	CO5	Acquire good knowledge about the uses of different active constituents of medicinal plants.

Syllabus

Unit	Content	Hours
I	**Phytochemical techniques** Cold and Hot Extraction methods, Liquid-Liquid Extraction techniques, Concentration and Evaporation Techniques, Lyophilisation; TLC, Preparative TLC, Column Chromatography, Gas-liquid Chromatography, High Performance Thin Layer Chromatography (HPTLC), High Performance Liquid Chromatography (HPLC), GCMS, LCMS.	-
II	**Spectroscopy** Colorimetric analysis of extracts; UV/Visible, IR, ^{1}H and ^{13}C NMR, 2D NMR and Mass Spectrometry; Application of Spectroscopic techniques in Structural elucidation of Secondary Metabolites. Finger Printing of extracts and Estimation of bioactive molecules.	-
III	**Bioactive secondary metabolites** **Steroids**: Occurrence and distribution in plants, Saponins, Sapogenins and Steroids; Isolation, Structural elucidation and Synthesis of Bioactive Steroids such as Cholesterol, Estrone, Estrodiol. **Terpenoids:** Isoprene units, Occurrence and distribution in Plants, Essential Oils, Aroma Chemicals, Mono and Sesquiterpenoids, use in Flavour and Perfumery Industry.	-

	Carotenoids- Occurrence and distribution in Plants. Isolation and Characterization of Vitamin A. Lycopene andBeta-Carotene.	
IV	**Bioactive Secondary Metabolites** **Alkaloids**: Occurrence and distribution in plants, bioactive alkaloids-isolation and structure elucidation of alkaloids such as Quinine, Papaverine, Nicotine, Atropine, Morphine, Caffeine. **Flavonoids**: occurrence and distribution in plants, isolation and characterization of Rutin, Quercetin. **Glycosides**- occurrence and distribution in plants, isolation and characterization of Amygdalin, Strophanthidin.	-
V	**Applications** Applications of Phytochemicals in Medicine and Pharmaceuticals, Biotechnology, Herbal and Modern Drug Industries, Food Flavour and Cosmetic Industries.	-
	TOTAL	-

Teaching Methodology: Self - Study

Books for Study:

1. Agarwal, P.K., Thakur, R.S. and Bansal, C.M. 1989. *Carbon-13* NMR of Flavonoids. Elsevier Science Publishers, Amsterdam
2. Anderson. J.W. and Beardall. J. 1991. Molecular Activities of Plant Cells. Blackwell Scientific Publications, Oxford

Books for Reference:

1. Apps, D.K. and Tipton, K.F. 1995. Essays in Biochemistry, Portland Press,London
2. Athkins, P. and Jones, I. 1999. Chemical Principles the Quest for Insight. W.H Freeman and Co. NewYork.

Course Designed by	Verified by	Checked by	Approved by
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Name: Dr. A. K. Vidya Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

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Sem.	Course Code	Non-Major Elective II: Information Security and Cyber Laws	Total Marks:75		Hours Per Week	Credits
IV	19UAKNT406		CIA :-	ESE :75	2	2

OBJECTIVE:

To enable the Students learn the basics of information security and gain the knowledge about all the aspects of Cyber laws and Cryptography.

COURSE OUTCOMES:

At the end of the course, the students will able to

CO1: Understand the basics of Information Technology (Understand)

CO2: Classify all types of crimes related to electronic records (Understand)

CO3: Use authentication technology in case of digital signatures (Apply)

CO4: Recognize Cyber laws and Security Policies and Cryptography (Remember)

CO5: Identify the different sections in Information Technology Act, 2000 (Remember)

UNIT- I

Introduction–Computer: Evolution, Generation, Types, Major Components, Characteristics and Limitations-Information Technology.

UNIT – II

Cyber Space: Salient Features of Cyber Space – Netizen – Cyber Crime - Malware or malicious Computer Codes - Network and Network Security.

UNIT – III

Cryptography – Encryption Technique and Algorithm and Digital Signature – Electronic Signature.

UNIT - IV

Cyber Laws - Components of Cyber Law - Indian Position - Amendment of some conventional laws - Wider Interpretation of other conventional laws.

UNIT – V

Cyber Law in India: An overview of Information Technology Act 2000.

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TEXT BOOK:

Dr. Jyoti Rattan - Cyber Laws & Information Technology-Sixth Edition, Bharat Law House Private Ltd., New Delhi, 2017.

UNIT I: Chapter 1: Section 1.1 – 1.3

UNIT II: Chapter 1: Section 1.4 – 1.5, Chapter 3, Chapter 4: Section 4.1- 4.2

UNIT III: Chapter 7

UNIT IV: Chapter 5: Section 5.1 – 5.3

UNIT V: Chapter 6

REFERENCEBOOKS:

1.Angur Shree Aggarwal, Sanjeev Kumar Sharma, Anuradha Tyagi, Shalu Goel- Information Security and Cyber Laws-First Edition, Vayu Education of India,New Delhi, 2011.

2. Richard E. Smith - Internet Cryptography – Pearson Education Private Ltd., 2013.

3. Neal Krawetz – Introduction to Network Security – Baba Barkha Nath Printers, New Delhi, 2007.

4. C K Shyamala, N.Harini, Dr T R Padmanabhan, Cryptography and Security-First Edition, Wiley India Private Ltd., New Delhi, 2011.

5. Atul Kahate- Crytography and Network Security-Second Edition, Tata McGraw–Hill Publishing Company Limited, New Delhi, 2008.

Question Paper Pattern
SECTION–A
Five Questions
(Either or Choice)
Two Questions from each unit
(5 x 15 = 75 Marks)

P.N.

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT501	Title: CORE VII - HUMAN PHYSIOLOGY AND ENDOCRINOLOGY	Batch:	2018 - 19 Onwards
			Semester:	V
Hours/Week:	5		Credits:	4

Objectives

- Learn about the Structure and Function of different organs in the body system
- Describe the principal structural features, Functions and location of each component organ of the endocrine, Cardiovascular, Respiratory, Digestive, Renal and Reproductive system
- Able to demonstrate a basic understanding of the mechanisms of human body
- Learn more specific on the endocrinal activities

Course Outcomes

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

K1	CO1	Understand the in-depth vision of blood, skeletal muscles and heart.
K2	CO2	Recognize the importance of nervous system and eye.
K3	CO3	Develop the basic knowledge of the Digestive tract and Respiratory system.
K4	CO4	Tell the impacts of the endocrine system.
K5	CO5	Understand the involvement of hormones in reproduction system.

Syllabus

Unit	Content	Hours
I	**Blood and Body fluid:** Composition and Functions of blood, Hemoglobin, Blood groups and Blood transfusion, Mechanism of blood coagulation. Formation and functions of Lymph. **Physiology of Skeletal muscle:** Structure of Skeletal muscle, Process of Muscle contraction, Chemical changes during Muscle contraction. **Cardiovascular system:** Structure and Functions of Heart, Electrical and mechanical events in Cardiac cycle, Regulation of Heart pumping.	11
II	**Physiology of Vision:** Structure of Eye, Receptor mechanism (Rod and Cones), Photo pigments, Defects of eye and Colour adaptation. **Nervous system:** Structure and Functions of Neurons, Resting potential and Action potential, Synaptic transmission (Chemical and Electrical Transmission). Mechanism of Neuromuscular transmission, Neurotransmitters. **Stress Physiology:** Definition, factors influencing response to stress, Stress Indicators.	11
III	**Digestive system:** General outlines of the Digestive tract. Composition, Function and Mechanism of Secretion of Saliva, Gastric, Pancreatic, Intestinal and Bile juice. Digestion and Absorption of Carbohydrates, Fats and Proteins.	11

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	Respiratory system: Structure and Function of Respiratory tract. Diffusion of Gases in lungs. Transport of Oxygen, Factors influencing the Oxygen transport. Transport of Carbon dioxide, Factors influencing the CO_2 transport.	
IV	**Excretory system:** Structure and Functions of kidneys, Structure of Nephron, Mechanism of formation of Urine, Micturition, Renal regulation of Acid base balance, Hormones of Kidneys. **Endocrine system:** Definition of Hormones, Classification - Chemical nature of Hormones and Mechanism of action of hormones (Intracellular and Cell surface receptor mechanism). Structure, Functions and Deficiency symptoms of hormones of Pituitary (Anterior and Posterior), Thyroid, Parathyroid, Adrenal glands.	11
V	**Male reproductive system**: Structure and functions of Testis, Process of Spermatogenesis, Structure and Physiological Functions of Androgen. **Female reproductive system**: Structure and function of Ovary, Ovarian cycle, Menstrual cycle, Physiological changes and Hormones involved in Pregnancy and Lactation.	11
	TOTAL	**55**

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. Dr. C.C. Chatterjee, Human Physiology - Volume I (2016) and II (2017), 11th Coloured Edition, CBS Publishers and Distributors Pvt. Ltd.
2. Sarada Subramanyam, K. Madhavan Kutty and H.D. Singh -Text Book of Human Physiology, Fifth Edition, S.Chand& Company Ltd, 2014.

Books for Reference:

1. Arthur C.Guyton and John Hall, Textbook of Medical Physiology, 12th edition, Saunders of ElsevierInc.2010.
2. Robert K. Murray, Harper's Biochemistry, 26th edition, McGraw Hill, 2003.
3. M. M. Muthiah, Lecture notes on Human Physiology Volume II, 1991.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. N. Sangeetha	Name: T. Radha	Name: S. Natarajan	Name: Dr. A. K. Vidya
Signature:	Signature:	Signature:	Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT502	Title: CORE VIII - CLINICAL BIOCHEMISTRY	Batch:	2018 - 19 Onwards
			Semester:	V
Hours/Week:	5		Credits:	4

Objectives

- To realize the importance of Clinical aspects of various disorders associated with Carbohydrate, Lipids, Proteins and Amino acids, Purine and Pyrimidine metabolism.
- To understand the significance of the Organ function test.

Course Outcomes

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

K1	CO1	Clearly understand the pathological regulations of carbohydrate metabolism.
K2	CO2	Make the learner aware of lipid metabolic changes.
K3	CO3	Realize the disease state of amino acid, purine and pyrimidine metabolism.
K4	CO4	Know the problems related to the preparation of the patient, the collection and knowledge of the samples.
K5	CO5	Identify the meaning and use of laboratory investigations in connection with diseases of the liver and kidneys.

Syllabus

Unit	Content	Hours
I	**Disorders of Carbohydrate metabolism** **Blood Sugar Regulation**: Normal, Random and Renal threshold level in blood and Mechanism of Regulation of Blood Sugar. **Diabetes Mellitus:** Definition, Symptoms, Types - I & II, Diagnosis - Urine test and GTT. **Complications of Diabetes mellitus:** Diabetic Hypoglycemia and Diabetic Ketoacidosis. **Other Carbohydrate Metabolic disorders:** Glycosuria, Fructosuria, Pentosuria, Galactosemia and Glycogen Storage diseases.	11
II	**Disorders of Lipid metabolism** Introduction - Plasma lipids and Lipoproteins. Hyperlipoproteinemia - Types I, II, III, IV, V and Hypolipoproteinemia – Alphalipoproteinemia & Abetalipoproteinemia. **Metabolic Disorders**: Atherosclerosis, Fatty liver, Xanthomatosis, Tangier's disease, Tay Sach's disease, Niemann's Pick disease.	11
III	**Disorders of Amino acid metabolism** **Inborn Errors of Metabolism:** Cysteinuria, Phenylketonuria, Maple syrup disease, Alkaptonuria, Albinism, Hartnup disease, Tyrosinemia. **Abnormalities of Non-protein nitrogen:** Urea, Uric acid, Creatinine, Ammonia. **Disorders of Purine metabolism**: Types and Treatment of Gout. **Disorders of Pyrimidine metabolism**: Oroticaciduria & Reye's Syndrome.	11

IV	**Gastric and Pancreatic Function Test** **Gastric function test:** Fractional gastric analysis, Stimulation test – Alcohol, Caffeine, Histamine, Insulin, Pentagastrin: Tubeless gastric analysis. **Pancreatic function test:** Serum Amylase and Lipase assay **Intestinal function Test** - Xylose excretion test	11
V	**Liver disease and Liver function test:** Introduction, Abnormal Bilirubin metabolism (Jaundice), Estimation of Bilirubin in serum (Diazomethod), Bile salt in serum (Fouchet's test, Hay sulfur test, Thymol turbidity test), Prothrombin time, Serum enzymes in liver diseases. **Kidney function test:** Clearance test - Definition, Urea, Creatinine and Inulin Clearance test. Renal blood flow and Filteration fraction - Water elimination test. **Tumor Markers:** Definition, Carbohydrate marker and Clinical importance -. PSA (Prostate specific antigen) and CEA (Carcino embryonic antigen).	11
	TOTAL	55

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. L Mukherjee, Kanai, SwarajitGhosh , Medical Laboratory Technology (Volume I): Procedure Manual for Routine Diagnostic Tests, 3rd edition, Mcgraw Hill publishers, 2010.
2. L Mukherjee, Kanai, SwarajitGhosh , Medical Laboratory Technology (Volume II): Procedure Manual for Routine Diagnostic Tests, 2nd edition, Mcgraw Hill publishers, 2010
3. Chatterjea M N and RanaShinde, Textbook of Medical Biochemistry, 5th Edition, Jaypee Brothers Medical Publishers (P) Ltd, 2002.
4. R. Swaminathan, Handbook of Clinical Biochemistry, 2nd Edition, World Scientific Publishers, 2011.
5. Varley H, Practical Clinical Biochemistry, 4th Edition,Boca Raton, Fla: CRC Press; London: Heinemann Medical Books, 1988.

Books for Reference:

1. Dr.S.Rajan, Manual for Medical Laboratory Technology, Anjanaa Book House, First Edition, 2012.
2. Teitz, Textbook of Clinical Chemistry and Molecular Diagnostics, 4th Edition, Elsevier Publisher, 2006.
3. Michael J. Stewart, James Shepherd, Allan Gaw , Michael Murphy, Robert A. Cowan, Denis St. J. O'Reilly, Clinical Biochemistry E-Book: An Illustrated Colour Text, 4th Edition, Churchill Livingstone, 2011.
4. Norbert W. Tietz, Fundamentals of Clinical Chemistry, 3rd Edition, W. B. Saunders Company, 1986.
5. Joan F. Zilva and Pannall P.R. Clinical Chemistry in Diagnosis and treatment, 6th Edition, Taylor & FrancisLtd, 1994.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	
Name: S. Natarajan Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT503	Title: CORE IX - MOLECULAR BIOLOGY	Batch:	2018 - 19 Onwards
			Semester:	V
Hours/Week:	5		Credits:	4

Objectives

- To understand the nature of Genetic material, Central Dogma of Life.
- To learn about Gene Repair mechanism and Gene mutation.
- To have an insight into Genetic Recombination.

Course Outcomes

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

K1	CO1	Acquire better knowledge about the replication machinery of DNA.
K2	CO2	Learn the basic steps of transcription and processing of RNA
K3	CO3	Integrate knowledge with the translation process of proteins.
K4	CO4	Know the recent advances in the recombination techniques
K5	CO5	Identify the mutations in genes and mechanism of transposans

Syllabus

Unit	Content	Hours
I	**Central Dogma of Life:** an overview **Replication:** Evidences of DNA as genetic material – Experimental Proof; Semiconservative mechanism and Experimental proof. **DNA Replication in Prokaryotes:** Bidirectional Replication – Theta Model, Unidirectional Replication – Rolling Circle model. Enzymology of DNA Replication, Steps in Replication – Initiation, Elongation and Termination. Fidelity of Replication. Differences between Prokaryotic and Eukaryotic Replication. Inhibitors of Replication. **DNA Damage and DNA Repair:** Types - Excision Repair, Mismatch Repair, Photo activation and SOS Repair.	12
II	**Transcription:** **Prokaryotic RNA Polymerases**. Steps in Transcription: Initiation, Elongation and Termination **Eukaryotic RNA polymerases**: Types and its Role. Processing of mRNA, rRNA and tRNA. Reverse transcription.	10
III	**Genetic Code and Translation** **Genetic Code:** Table and its salient features. Composition of Prokaryotic and Eukaryotic Ribosomes. **Translation:** Activation of Amino acids, Initiation, Elongation and Termination of Protein synthesis; Inhibitors of Protein synthesis. Post translational modifications of Proteins.	

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IV	**Recombination in bacteria:** Transformation, Transduction and Conjugation. **Prokaryotic Gene Regulation:** Operon Model - Lac operon (Positive and Negative control); Trp operon (Repression and Attenuation) **Recombination:** Definition and Mechanism of Holliday model for Homologous Recombination.	11
V	**Gene Mutation and Transposons** **Gene Mutation** - Definition and Types; Test for Carcinogenicity - Ame's test. Selection of Auxotrophic mutants – Replica plating, Penicillin Enrichment Technique. **Bacterial Transposons:** Insertion sequences; Mechanism of Transposition in bacteria.	11
	TOTAL	**55**

Teaching Methodology: Chalk and Talk, PPT

Books for Study:

1. Lodish*et al.,* Molecular Cell Biology, 4th Edition, W. H. Freeman and Company, 2000.
2. Watson, Molecular Biology of the gene, 5th Edition, Pearson Education, 2004.
3. David Clark, Molecular Biology, 3rd Edition, Michelle McGehee, 2019.

Books for Reference:

1. Albert*set al.,* Molecular Biology of the cell, 4th Edition, Garland Science Publications, 2002.
2. Jeyanthi.G.P, Molecular Biology, 1stEdition, MJP Publishers, 2009.
3. Twyman, Advanced Molecular Biology, 1st Edition, Viva publication, 2003.
4. Lewin, Genes IV, 4th Edition, Prentice HallInternational, 2004
5. Lewin, Genes VIII, 4th Edition, Prentice Hall International, 2004.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: G. Karthikeyan Signature:	Name: R. Rasu Signature:	Name: T. Radha Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT504	Title: CORE BIOCHEMISTRY PRACTICALS - III	Batch:	2018 - 19 Onwards
			Semester:	V
Hours/Week:	5		Credits:	3

(EXAMINATION AT THE END OF FIFTH SEMESTER)

Objectives

- To understand and get familiarized with the analysis of urine and blood samples.

Course Outcomes

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

K1	CO1	Understand the abnormal constituents in urine.
K2	CO2	Quantify the calcium and creatinine in 24 hour urine sample.
K3	CO3	Analyze the NPN compounds in urine samples.
K4	CO4	Gain knowledge about kidney function tests in blood.
K5	CO5	Familiarize with cancer marker enzymes.

Syllabus

Unit	Content	Hours
I	**COMPLETE URINE ANALYSIS** **Dipstick analysis (Macro & Microscopic examination)** Appearance, Colour, Urine PH, Specific gravity, Urinary glucose, Urinary protein, Urobilinogen, Bile salt, Ketone Bodies, Occult Blood, Pus cells, Epithelial cells, Cast & crystals and others	5
II	**Quantitative analysis ofurine** Estimation of Calcium by Permanganate method. Estimation of Creatinine by Picric acid method.	10
III	**Quantitative analysis ofurine** Estimation of Urea by DAM-TSC method. Estimation of Uric acid by Carraway's method.	10
IV	**BLOOD ANALYSIS** Estimation of Urea in serum by DAM –TSC method Estimation of Uric acid in serum by Carraway's method Estimation of Glucose in serum by O-Toluidine method	15
V	**Demonstration Experiment** Estimation of Alkaline phosphatase in serum Estimation of Acid phosphatase in serum	5
	TOTAL	55

Teaching Methodology:
Demonstration following individual Practicals

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Books for Study:

1. Dr. S. Rajan. Manual for Medical Laboratory Technology. 1st Edition. Anjanaa Book House, 2012.

Books for Reference:

1. Ranjna Chawla. Practical Clinical Biochemistry - Methods and Interpretation, 3rd Edition. Jaypee Brothers Medical Publishers (P) Ltd, 2019.
2. Alan H.Gowenlock, Janet R.Mc Murray and Donald M.Mc Lauchlan, Varley's Pracical Clinical Biochemistry. CBS Publishers and Distributors, 2006.

Course Designed by	Verified by	Checked by	Approved by
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Name: Mr. S. Natarajan Signature:	Name: R. Rasu Signature:	Name: T. Radha Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT604	Title: CORE BIOCHEMISTRY PRACTICALS - IV	Batch:	2018 - 19 Onwards
			Semester:	V & VI
Hours/Week:	3 (ODD) & 5 (EVEN)		Credits:	3

(EXAMINATION AT THE END OF SIXTH SEMESTER)

Objectives

- To understand and get familiarized with the Physiology, Immunology, Plant and Molecular studies.

Course Outcomes

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

K1	CO1	Understand the serological parameters.
K2	CO2	Acquire knowledge about Antigen - Antibody Reaction.
K3	CO3	Get better knowledge with screening of secondary metabolites.
K4	CO4	Acquire practical exposure with analysis of biochemical constituents in plants.
K5	CO5	Gain knowledge in molecular techniques.

Syllabus

Unit	Content	Hours
I	**PHYSIOLOGY EXPERIMENTS** 1. Bleeding & clotting Time 2. Prothrombin Time 3. Estimation of Hemoglobin in Whole blood (Cyanmethemoglobin method)	9
II	**IMMUNO TECHNIQUES: (Qualitative Kit Method)** 1. Identification of Blood group and Rh factor. 2. RA factor. 3. Pregnancy test. 4. WIDAL test. 5. VDRL test. 6. CRP test. 7. Immuno Diffusion (Group Experiment)	27
III	**PLANTBIOCHEMISTRY** Qualitative analysis of Secondary Phytochemicals in Five Medicinal Plants	20
IV	**PLANTBIOCHEMISTRY** Quantitative analysis 1. Estimation of Chlorophyll 2. Estimation of Starch from Potato - Anthrone Method 3. Total Antioxidant activity of medicinal plants - DPPH Assay	15
V	**MOLECULAR TECHNIQUES** (Group Experiment) 1. Buccal Smear - Identification of BARR BODY 2. Separation of DNA by Agarose Gel Electrophoresis	5
	TOTAL	78

Teaching Methodology:
Demonstration following individual Practicals

Books for Study:

1. Dr. S. Rajan. Manual for Medical Laboratory Technology, 1st Edition, Anjanaa Book House, 2012.
2. Verma S K, A textbook of Plant Physiology and Biochemistry, 3rdRevised Edition. S.Chand& Company,2000.

Books for Reference:

1. RanjnaChawla, Practical Clinical Biochemistry, Third Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi 2014.
2. Alan H.Gowenlock, Janet R.McMurray and Donald M.McLauchlan, Varley'sPracical Clinical Biochemistry, CBS Publishers and Distributors, New Delhi 4th Edition 2010.

Course Designed by	Verified by	Checked by	Approved by
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Name: T. Radha Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPET506	Title: ELECTIVE I: PLANT AND ANIMAL BIOTECHNOLOGY	Batch:	2018 - 19 Onwards
			Semester:	V
Hours/Week:	4		Credits:	4

Objectives

- To understand the basic concepts of Plant tissue culture and Plant transformation techniques
- To learn the techniques of maintaining animal cells/tissues in in-vitro cultures and use of cell cultures in production of biological products

Course Outcomes

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

K1	CO1	Basic knowledge with Plant Tissue culture and its methods.
K2	CO2	Knows the techniques plant genetic engineering.
K3	CO3	Gain basic information for animal tissue culture techniques
K4	CO4	Provide broad foundation about the cell transformation techniques.
K5	CO5	Learn methods of animal biotechnology

Syllabus

Unit	Content	Hours
I	**Introduction to Plant Tissue Culture and Culture methods** **Plant Tissue culture:** Terms used in PTC, Explant - Types and Sterilization, Glassware Sterilization, Establishment of PTC laboratory. **PTC Medium:** Composition, Preparation, Sterilization (MS Medium). **Culture methods**: Callus culture and Suspension Culture. **Micro propagation (Clonal Propagation):** Organogenesis and Somatic Embryogenesis. Production of Haploid Plants, Production of Phytochemicals from PTC.	8
II	**Plant Transformation Techniques** **Protoplast Culture and Somatic Hybridization:** Protoplast Isolation, Culture and Regeneration. Fusion of Protoplasts, Selection and Identification of Somatic hybrids. **Gene transfer in Plants** **Vector mediated gene transfer methods:** Agrobacterium mediated gene transfer: Ti Plasmid, Mechanism of T-DNA transfer. **Direct gene transfer methods:** Electrophoration, Biolistics, Microinjection, PEG and Calcium phosphate coprecipitaion mediated gene transfer. **Application of PTC:** Transgenic Plants - Herbicide, Insecticide and Virus Resistant plants. Flavr-Savr Tomato, Golden Rice, Bt Cotton.	9

III	**Introduction to Animal cell culture** Terms used in ATC, Facilities for ATC, Contamination, Aseptic Condition and Sterilization. **Culture Media for Animal Cells** Types of Media – Natural and Artificial Media, Physicochemical Properties of Media, BSS, Complete culture medium, Importance of Serum in Media, Serum-free media.	9
IV	**Establishment of Cells in Culture**: Primary cell culture – Mechanical disaggregation, Enzymatic disaggregation and Primary Explant Techniques. Cell lines – Finite and Continuous Cell lines. **Cell transformation:** Properties of Transformed cells. Measurement of growth parameters of cultured cells. Cell Synchronization.	9
V	**Gene transfer in Animals:** Production of Transgenic Mice – Microinjection and Embryogenic Stem cell method. **Animal Biotechnology:** Invitro fertilization (IVF): Stages, Advantages and Limitations. **Recombinant proteins from Cell cultures:** Viral Vaccines (Vaccinia Virus Vaccine) and Production of Monoclonal Antibodies **Application and Ethical Issues:** ELSI of biotechnology - Risks, Ethics and Patenting.	9
	TOTAL	**44**

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. U. Satyanarayana, Biotechnology, 12th Edition, Books and Allied (P) Ltd, 2018.
2. D. Balasubramanian et al., Concepts in Biotechnology, Revised Edition, Universal Press, 2018.

Books for Reference:

1. R. Ian Freshney, Culture of Animal Cells -- A manual of Basic Techniques, 7th Edition, A John Wiley & Sons Inc. Publications, 2016.
2. Michael J. Waites, Industrial Microbiology - An Introduction, I edition, Blackwell Publishing, 2002.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: T. Radha Signature:	Name: Dr. N. Sangeetha Signature:	Name: R. Rasu Signature:	Name: Dr. A. K. Vidya Signature:

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPST508	Title: SKILL BASED COURSE III - MEDICAL CODING	Batch:	2018 - 19 Onwards
			Semester:	V
Hours/Week:	3		Credits:	3

Objectives

- To help meet the demands for industry-current professionals with the knowledge and skills to pursue Career opportunities in the growing Health care industry.
- To acquire knowledge in Medical terminology, computerized billing procedures and Medical coding.
- To develop skills to accurately report diagnoses and procedure codes through the application of official coding guidelines in ICD, CPT and HCPCS.
- To effectively identify, understand, and utilize medical codes as they will be applicable to hospital reimbursement in the field of health care.

Course Outcomes

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

K1	CO1	Attain the knowledge of Basic terminologies in Medical profession.
K2	CO2	Understand the terms in Medical world.
K3	CO3	Know the importance of documentation.
K4	CO4	Gain an idea about coding system.
K5	CO5	Learn concepts of reimbursement methodologies, Fraud and abuse.

Syllabus

Unit	Content	Hours
I	**Medical Terminology** Fundamentals of the language for the medical profession, Diagnostic procedures, Laboratory tests. **Terminology: (Definitions only) Hematology** - Aplastic anemia, Erythrocytapheresis, Hematocrit, Thrombosis, Hemostasis, Hypoxemia, Neoplastic disease, Thrombocytopenia, Extracarponeal Circulation and Von Willebrand disease. **Terminology: (Definitions only) Cardiology** – Arrhythmias, Flutter, Fibrillation, Varicose vein, Hemorrhoids, Coronary Artery Disease, Endocardilis, Endarterectomy, Thrombolytic therapy and Coronary Bypass Surgery (CABG). **Terminology: (Definitions only) Gastroenterology** - Achlorhydria, Hematochesis, Achalasia, Diverticulitis, Ulcerative Colitis, Colonic Polyposis, Abdominoperineal Resection, Anastomosis, Aneurysm and Colostomy. **Terminology: (Definitions only) Pulmonology** – Croup, Pertussis, Cystic Fibrosis, Atelectasis, Emphysema, Pneumoconiosis, Pulmonary abscess, Pleural Effusion, Tracheostomy and Mediastinoscopy.	7

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II	**Terminology: (Definitions only) Neurology** – Alzheimer's disease, Dementia, Cerebral Thrombosis, Cryothalamotomy, Electroencephalogram (EEG), Encephalitis, Guillain-Barré Syndrome, Myelogram, Pallidotomy and Positron Emission Tomography (PET) Scan. **Terminology: (Definitions only) Opthamology** - Glaucoma, Macular degeneration, Retinal detachment, Retinitis pigmentosa, Astigmatism, Hyperopia, Myopia, Presbyopia, Tonometry and Otolaryngology. **Terminology: (Definitions only) Musculoskeletal system** – Muscular Dystrophy, Cerebral Palsy, Dermatomyositis, Myasthenia Gravis, Mitochondrial myopathies, Myotonia, Bursitis, Osteoporosis, Adduction and Palpation **Terminology: (Definitions only) Urology and Nephrology** – Nephritis, Nephrosis, Cystitis, Urethritis, Urethral Stricture and Cystometry, **Terminology: (Definitions only) Gynecology and Obstetrics** **Male Reproductive system** – Coitus interruptus, Gonadal dysgenesis, Hypoestrogenism, VaricoceleandVasectomy. **Female Reproductive system** - Amenorrhea, Psychogenic pain, Amniocentesis, Antepartum, Uteroplacental circulation, Hysterectomy and Colpocytogram.	7
III	**Health Information Management** Introduction to Health Information Management - Content and structure of Healthcare data - Content of medical records - Documentation requirements for medical records. Healthcare Delivery Systems -Types of healthcare organizations and healthcare workers.	7
IV	**Clinical Classification Systems** Basic Diagnosis Coding Systems - Introduction to ICD-9-CM: Overview, General Structure, Basic Operating Guidelines. Introduction to Current Procedural Terminology (CPT) - Purpose, History, General Structure, Basic Operating Guidelines.	6
V	**Reimbursement Methodologies** Ambulatory Surgery Center reimbursement - Third-party payers - Billing and Insurance procedures - Quality Improvement Organizations (QIO) and their role in the Payment process. **Issues with Fraud and Abuse** Regulatory issues and guidelines - Department of Health and Human Services on Healthcare Fraud and Abuse. Standardization in Coding HIPAA Background and Explanation	6
	TOTAL	33

Teaching Methodology:
Chalk and Talk, PPT

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Books for Study:

1. Barbara A. Gylys Mary Elen Wedding - Medical Terminology Systems, Davis plus International Publisher, 6th Edition, 2008.
2. Betsy J Shiland (2017), 'Medical Terminology & Anatomy for Coding', 3rdEdition, Elsevier Science Publisher Ltd.

Books for Reference:

1. Optum, Guide to Clinical Validation, Documentation and Coding, First Edition, Kindle Book Publishers, 2020.
2. http://www.icd9data.com
3. Coders' Dictionary 2013 byIngenix.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. N. Sangeetha Signature:	Name: R. Rasu Signature:	Name: T. Radha Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT601	Title: CORE X - MEDICINAL BIOCHEMISTRY	Batch:	2018 - 19 Onwards
			Semester:	VI
Hours/Week:	5		Credits:	4

Objectives

- Understood the development of the traditional and modern methods used for Drug discovery; of how molecules interact.
- Learnt the fact that the pharmaceutical industry is by far the largest employer of medicine.
- Learnt and developed skills in the use of reaction mechanisms and how knowledge of reaction mechanisms can aid in understanding the mode of action of a drug and the method by which it can be synthesized and developed.

Course Outcomes

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

K1	CO1	Gain knowledge for the concepts of drug and its specified receptors.
K2	CO2	Knows the fundamentals about drug metabolism.
K3	CO3	Identify the drug for chemotherapy.
K4	CO4	Obtain an idea about recurring cardio vascular diseases and Diabetes Mellitus.
K5	CO5	Expose with the effects of Drug abuse and basics of Drug Design.

Syllabus

Unit	Content	Hours
I	**Basic concepts of Drug and Receptor** **Basic concept of Drug:** Introduction to drugs, Classification of drugs, Passage of drugs across biological membrane; Absorption and Distribution of drugs; Binding of drugs to Plasma Proteins. **Drug Receptor:** Types of receptors, Receptor theories, Isolation of receptors, Drug receptor interaction, Binding forces in drug receptor interaction.	9
II	**Drug Metabolism and Elimination** **Drug Metabolism:** **Microsomal drug metabolism** - Metabolism via Hydroxylation, Conjugation (Glucuronic acid and Sulfate conjugation), Deamination, N-Oxidation, Azo and Nitro reduction. **Non-microsomal drug metabolism** - Non-microsomal oxidation, Oxidative deamination, Purine oxidation, Dehalogenation, Hydrolysis. **Elimination of Drugs:** Elimination of drugs from the body with reference to renal system.	9
III	**Chemotherapy** **Antimetabolites:** Anti-metabolites of folate, purines and pyrimidines. **Antibacterial drugs:** Mode of action and resistance to Sulfonamides, Penicillin, Streptomycin, Tetracycline and Chloramphenicol.	9

	Antiviral drugs: Classification and mechanism of action of Acyclovir and Zidovudine. **Antimalarial drugs:** Classification. Life cycle of malarial parasites in man and Mechanism of action of antimalarial drugs.	
IV	**Drugs acting on Cardio-vascular system and Diabetes Mellitus** **Cardio-vascular system:** Cardio-vascular disease, Structure and mode of action of Cardiac glycosides, Heparin and Coumarin. **Diabetes Mellitus:** Insulin, Oral hypoglycemic agents - Sulphonylureas, Biguanides, Thiazolidinodiones and Alpha - glucosidaseinhibitors.	9
V	**Drug Abuse and Drug Discovery** Drugs from Plant origin, Definition of drug dependence and Drug abuse. **Drug Discovery** – Ligand based drug designing and computer based drug designing. Applications of Computational biology and Artificial Intelligence in drug discovery.	9
	TOTAL	**45**

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. K. D. Tripathi, Essentials of Medical Pharmacology, 7th Edition, Jaypee Brothers Medical Publications (P) Ltd, 2013.
2. Salil K Bhattacharya, ParantapaSen and Arunabha Ray. Pharmacology 2 nd Edition, Elsevier Publication,NewDelhi,2004.

Books for Reference:

1. Satoskar R. S. Bhandarkar, S.D and S.S. Ainapure, Pharmcologyand Pharamacotherapeutics, 14thEdition,Popular PrakashnanBombay, 2017.
2. William Foye, Principles of Medicinalchemistry, 3rd edition, Wolters Kluwer Publications, 2012.
3. Grahame D. G. Smith and Aronson. J.K. Oxford T.B of Clinical Pharmacology and Drug therapy, 2nd Revised Edition, Oxford University Press, 1992..

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: R. Rasu Signature:	Name: T. Radha Signature:	Name: Mr. S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT602	Title: CORE XI - PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS	Batch:	2018 - 19 Onwards
			Semester:	VI
Hours/Week:	5		Credits:	4

Objectives

- To gain knowledge on basic physiological aspects of transpiration, respiration and photosynthesis
- To acquire knowledge on the applied aspects of plant
- To gain a holistic approach on research related to plant genetic manipulation and Plant-Environment interaction.

Course Outcomes

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

K1	CO1	Know basic physiological aspects of transpiration, respiration.
K2	CO2	Gain the fundamentals idea about photosynthesis machinery in plants.
K3	CO3	Recognize and understand the importance of nutrition for plant growth.
K4	CO4	Describe the practical applications of plant growth regulators.
K5	CO5	Learn about the functions of secondary metabolites.

Syllabus

Unit	Content	Hours
I	**Absorption of Water and Transpiration** **Plant Cell:** Structure and Functions. **Water absorption by plants:** Mechanism of water absorption (Active & Passive)and factors affecting the rate of water absorption. **Transpiration:** Types of transpiration, Mechanism of transpiration, Opening and closing of stomata; Factors affecting the rate of transpiration.	9
II	**Photosynthesis:** Definition, Photosynthetic apparatus, Photosynthetic pigment – Chlorophyll, Carotenoids and Phycobilins, Mechanism of Photosynthesis. **Light reaction:** Photo system I and II. Photo oxidation of Water. Cyclic and Non – Cyclic Photophosphorylation. Light reaction - Hill's reaction, Arnon's work and Emerson effect. **Dark reaction:** Calvin cycle (C3 Plants), Hatch Slack cycle (C4 Plants) and CAM Plants, Photorespiration (C2 Plants)	9
III	**Cycle of elements** **Nitrogen cycle:** Ammonification, Nitrification, Nitrate reduction and Denitrification. **Nitrogen fixation:** Symbiotic and Non Symbiotic nitrogen fixation. Sulphur cycle, Phosphorous cycle and Carbon cycle.	9

	Plant Nutrition: Specific roles of essential elements and their deficiency symptoms in plants. **Micronutrients:** Manganese, Boron, Copper, Zinc, Molybdenum and Chlorine **Macronutrients:** Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Phosphorous, Calcium, Potassium, Magnesium and Iron.	
IV	**Plant growth regulators** Chemistry, Biosynthesis, Mode of action and Practical applications of Auxin, Gibberellin, Cytokinin, Absicic acid and Ethylene. Biochemical Changes during Fruit Ripening. Photo morphogenesis: Phytochrome and its function.	9
V	**Life cycle of plants and its biochemical changes** Seed Dormancy - Causes, Methods of breaking Dormancy; Seed Germination and Senescence - Biochemical changes. **Secondary metabolites** Nature, Distribution and biological functions of Alkaloids, Flavonoids and Terpenes. Role of secondary metabolites in pathogens, insects, animals and mankind.	9
	TOTAL	**45**

Teaching Methodology: Chalk and Talk, PPT

Books for Study:

1. S. K. Verma, A Textbook of Plant physiology and Biochemistry, 6th Edition, S. Chand &Company Ltd, 2007

Books for Reference:

1. Devlin N. Robert and Francis H. Witham, Plant physiology, 2nd Edition, CBS Publications, 2017
2. Bob, Buchannan, "Biochemistry and Molecular biology of plants", 2nd Edition, I.K International Pvt. Ltd, 2015
3. Lea and Lea woods Plant Biochemistry and Molecular Biology, 2nd Edition, John Wiley and sons, 1999.

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Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: T. Radha Signature: Radha	Name: R. Rasu Signature:	Name: Dr. A. K. Vidya Signature:	Name: Dr. A. K. Vidya Signature:

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCT603	Title: CORE XII - IMMUNOLOGY AND IMMUNOTECHNIQUES	Batch:	2018 - 19 Onwards
			Semester:	VI
Hours/Week:	4		Credits:	4

Objectives

- Understood the foundation for the future subjects in microbiology and Immunology.
- Learnt the basic terminology and techniques in microbiology and immunology.
- Learnt on how much immune system is important to the humans.

Course Outcomes

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

K1	CO1	Understand the immune response to our body.
K2	CO2	Know about the interactions of antigen and antibody and complement system.
K3	CO3	Understand the concept of Immunotechniques with applications.
K4	CO4	Gain an idea about reactions of hypersensitivity.
K5	CO5	Clearly illustrate the criteria's of transplantation and vaccination.

Syllabus

Unit	Content	Hours
I	**Basic principles of Immunology:** History, Innate and Acquired immunity, Antibody mediated and Cell mediated immune response. **Lymphoid organs:** Primary and Secondary lymphoid organs. **Cells of the immune system:** Structure and functions of T cell, B cell, Null cell, Dendritic cell, Macrophage, Neutrophil, Eosinophil and Basophil.	7
II	**Antigen:** Antigenicity, Immunogenicity - factors, Epitope and Paratope, Haptens, Adjuvants, Cross reactivity, Self-antigens (MHC) an outline only. **Antibodies:** Structure, Functions, Properties, Classes of Immunoglobulins - IgG, IgA, IgM, IgE, IgD and IgY. Clonal Selection Theory of antibody formation. **Antigen-antibody interaction:** Precipitation and Agglutination - Definition and mechanism of formation. **Complement system**: Complement components and Complement pathways - Classic, Alternative and Lectin. **Cytokines:** Interleukin, Interferon and TNF - Functions.	8
III	**Immuno Precipitation in Gel:** Ouchterlony procedure, Oahley – Fulthope procedure, Immunodiffusion, Single radial procedure, Immuno electrophoresis and Electro immuno diffusion. **Agglutination Test:** Slide agglutination - Blood Grouping - Tube agglutination - Widal test. **Immunotechniques:** RIA, ELISA, FIA and Complement fixation test.	

IV	**Hypersensitivity:** Type I, II, III and IV and their clinical manifestations. **Autoimmune Diseases:** Definition. Classification. Rheumatoid arthritis. Myasthenia gravis. **Immunity to infective diseases:** Immunity to Bacterial and Viral diseases.	7
V	**Transplantation:** Definition of Graft and its types, Mechanism of Allograft rejection, Graft vs Host Diseases. Immuno suppressors. **Resistance to tumors:** Tumor antigens, NK Cells, Tumor immuno therapy. Lymphoid tumors - Burkitt's Lymphoma. **Vaccination:** Passive and Active immunization, Recombinant vaccines - Attenuated Vaccine, DNA vaccines, Benefits and adverse effects of Vaccination.	7
	TOTAL	**36**

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. Janis Kuby, Immunology, 8th Edition,WH Freeman Publications, 2019.
2. Tizzard R Jan, Immunology - An introduction, 3rd Edition, Saunders College Pub,1995.
3. Lauren Sompayrac, How the immune system works, 6th Edition, Wiley Blackwell, 2019.

Books for Reference:

1. RoittIvann, Jonathan Brastoff, David Male,Immunology, 13thEdition, Atithi Medical Books (P) Ltd, 2017.
2. Ananthanarayanan. R. and YayaramanPanikar, Text book of Microbiology, 10th Edition, Universities Press, 2017.
3. By Abul K Abbas, Andrew H Litchman, Shiv Pillai, Basic Immunology (Functions and Disorders of immune system), 6th Edition, Elsvier, 2019.

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Name and Signature	Name and Signature	Name and Signature	HOD
Name: G. Karthikeyan Signature:	Name: M. S. Natarajan Signature:	Name: R. Rasu Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPCP605	Title: ELECTIVE II – BIOINFORMATICS PRACTICALS	Batch:	2018 - 19 Onwards
			Semester:	VI
Hours/Week:	4		Credits:	3

Objectives

- Learn Fundamental practical knowledge of biological Databases and Sequence alignment

Course Outcomes

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

K1	CO1	Work in MS Office and HTML.
K2	CO2	Understand the way of working in biological databases and data retrieval tools.
K3	CO3	Develops the knowledge in Sequence similarity searching.
K4	CO4	Know to perform different gene prediction.
K5	CO5	Get a fundamental knowledge with the sequence alignment tools.

Syllabus

Unit	Content	Hours
I	Working with MS-Office Packages - One exercise each in Word, Excel Power point and Access Working with HTML Tags and HTML Forms. Creating HTML Pages	8
II	Biological Databases - Analysis of Protein and Nucleic acids sequences (NCBI, EMBL and DDBJ) Sequence similarity searching (NCBIBLAST)	5
III	Gene structure and function prediction (using Gen Scan, GeneMark) Protein sequence analysis (ExPASy Proteomics tools)	5
IV	Sequence analysis using EMBOSS Multiple sequence alignment (Clustal)	5
V	Molecular Visualization Tool (RASMOL. Spdbv)	5
	TOTAL	**36**

Teaching Methodology:

Books for Study:

1. S.C. Rastogi& others, "Bioinformatics - Concepts, Skills, and Applications", 2nd Edition, CBS Publishing, 2019.
2. Mani KandVijayaraj N., Bioinformatics - A PracticalApproach, 3rd Edition, Aparna publications, 2004.

Books for Reference:

1. S. Ignacimuthu, S.J."Basic Bioinformatics', 2nd Edition, Narosa Publishing House.2013.
2. C.S. Tsai, An Introduction to Computational Biochemistry, 1st Edition, WileyLiss.2002.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. N. Sangeetha Signature:	Name: R. Rasu Signature:	Name: Dr. A. K. Vidya Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	20UAPST611	Title: SKILL BASED COURSE IV - BIOINFORMATICS	Batch:	2018 - 19 Onwards
			Semester:	VI
Hours/Week:	3		Credits:	3

Objectives

- To enable the students to understand scope of Bioinformatics
- Understanding of popular bioinformatics database
- Learn Fundamentals of Databases and Sequence alignment
- Approaches to drug discovery using bioinformatics techniques

Course Outcomes

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

K1	CO1	Know the scope and importance of bioinformatics.
K2	CO2	Understand the importance of different databases.
K3	CO3	Gain the sequence alignment methods.
K4	CO4	Interpret the prediction methods of various Biomolecules.
K5	CO5	Apply knowledge on current commercial bioinformatics.

Syllabus

Unit	Content	Hours
I	**Bioinformatics:** Introduction, History, Scope, Aims and tasks. Challenges, Opportunities and Applications of Bioinformatics. Internet basics: WWW& HTML. Introduction to NCBI data model; Various file formats for biological sequences.	6
II	**Databases Tools and their uses** **Biological databases:** Definition and Types **Primary databases:** Nucleic acid databases (NCBI, GenBank, DDBJ & EMBL), Protein databases (SwissProt, TrEMBL& PIR). **Secondary databases:** PROSITE, BLOCK &PRINT. **Structural databases:** CATH, SCOP & PDB.	7
III	**Sequence Alignment methods** Introduction and significance of sequence alignment. **Types:** Local alignment and Global alignment. **Algorithm:** Comparison between Needleman-Wunsch Algorithm and Smith-Waterman Algorithm. **Scoring Matrices:** PAM and BLOSUM. Use of Gap Penalties in Sequence Alignments. **Pairwise sequence alignment:** BLAST and FASTA. **Multiple sequence alignment (MSA):** Methods, Tool (CLUSTALW) and Application.	7

IV	**Predictive methods using DNA and Protein Sequences** **Gene predictions:** Methods - Laboratory based, Feature based, Homology based, Statistical and HMM based **Protein prediction:** Methods -Chou-Fasman, Nearest Neighbour, HMM, Neural Network and Ab initio Approach. **Molecular Visualization Tools:** RASMOL, Spdbv, Jmol **Phylogenetic analysis:** Concept of Phylogenetic trees and Multiple Alignments - PHYLIP.	7
V	**Commercial Bioinformatics** Survey of Bioinformatics companies in India and Abroad – Economics prospects – Pharmainformatics – Combinatorial Chemistry – HT screening – In Silico screening - from lead to commercialization; **CADD:** Stages and applications of molecular docking, Discovering a drug - Target identification and validation - identifying the lead compound - Optimization of lead compound - Chemicallibraries.	6
	TOTAL	**33**

Teaching Methodology:
Chalk and Talk, PPT

Books for Study:

1. S.C. Rastogi & others, "Bioinformatics - Concepts, Skills, and Applications", 2nd Edition, CBS Publishing, 2019.
2. Andreas D Baxevanis& B F Francis, "Bioinformatics - A practical guide to analysis of Genes & Proteins", 4th Edition, John Wiley, 2000.
3. T K Attwood, D J Parry – Smith, "Introduction to Bioinformatics", 1st Edition, Pearson Education, 2005.

Books for Reference:

1. C S V Murthy, "Bioinformatics", 1st Edition, Himalaya Publishing House, 2003.
2. David W.Mount, "Bioinformatics sequence and Genome analysis", 4th Edition, Cold spring harbor laboratory press, 2004.
3. S. Ignacimuthu, S.J., 'Basic Bioinformatics', 2nd Edition, Narosa Publishing House, 2013.
4. C.S. Tsai, An Introduction to Computational Biochemistry, 1st Edition, WileyLiss, 2002.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. N. Sangeetha Signature:	Name: Mr. S. Natarajan Signature:	Name: T. Radha Signature:	Name: Dr. A. K. Vidya Signature:

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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	17UAPAL509	Title: ADVANCED LEARNERS COURSE III - CANCER BIOLOGY	Batch:	2017 - 18 Onwards
			Semester:	VI
Hours/Week:	Self-Study		Credits:	2

Objectives

- Explain the mechanisms of DNA damage and how this process is linked to cellular transformation and cancer risk.
- Understand the common cellular and molecular mechanisms that are deregulated in cancer cells.
- Develop an understanding of how a cancer cell develops into a malignant tumor.
- Illustrate how basic research translates into novel therapeutic approaches.
- Encourage the development of critical thinking and analytical skills that enable critical interpretation of primary scientific literature.

Course Outcomes

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

K1	CO1	Understand the basics of cancer.
K2	CO2	Gain knowledge about cellular and molecular mechanisms of cancel cells.
K3	CO3	Clearly understand the mechanism of oncogenesis and apoptosis.
K4	CO4	Get a foundation in the cancer cell signaling molecules.
K5	CO5	Understand the approaches of cancer therapy

Syllabus

Unit	Content	Hours
I	**Basics of Cancer:** History, Scope and Current scenario of Cancer research. Cancer – Types and their prevalence,–Carcinoma, Lymphoma and Malignancy - Classification based on Origin/Organ: Breast, Colon, Lung, Prostrate, Cervical and Oral cancers.	-
II	**Cell Cycle and Cell culture:** Regulation of the Eukaryotic cell cycle, Cell birth, Lineage and cell death. Cellular morphology, Primary and Established cell lines, Kinetics of Cancer cell growth, Genetics of cancer cells. Cancer stem cell culture and their applications. Cell culture based Vaccines.	-
III	**Molecular mechanism of Oncogenesis:** Proto oncogenes, Oncogene, Oncoproteins, Other tumour suppressor proteins and Receptors proteins involved in cancer. **Apoptosis and Cancer:** Mechanism of apoptosis - Proteins involved in apoptosis - Signaling pathways: Types and their impact on apoptosis and oncogenesis - Significance of RB, Cyclins, RTK, CDKs, related pathways.	

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IV	**Cell Signalling in Cancer Cell lines:** MCF-7, HeLa, HepG2 and A549. Types of Signaling pathways that control gene activity. Integration of signals and gene controls. Moving proteins into membranes and organelles, Vascular traffic, secretion and endocytosis, Metabolism and movement of lipids.	-
V	**Principle and Methods of Cancer diagnosis:** Biochemical, Genetic, Cytotoxic and cell growth and viability tests. **Cancer Therapy** – Cellular level - Gene level - Protein level. Principles of Cancer Biomarker and their applications – Chemotherapeutics for Cancer, Phytotherapy for Cancer.	-
	TOTAL	-

Teaching Methodology: Self - Study

Books for Study:

1. Tannock IF and Hill RP (1998) The Basic Science of Oncology, Third Edition, McGraw-Hill. NewYork.
2. Bronchud MH, Foote M, Giaccone G, olopade O and Workman P (2008) Principles of Molecular Oncology, Third Edition, Humana Press, New Jersey.

Books for Reference:

1. Depatin KM and Fulda S (2008) Apoptosis and Cancer Therapy, WILEY-VCHVerlag GmbH and Co., NewYork.
2. Hayat MA (2010) Methods of Cancer Diagnosis, Therapy, and Prognosis, Vol-7; Springer, Netherland.
3. Missailidis S (2008) Anticancer Therapeutics, John Wiley and Sons, Ltd.,USA.

Course Designed by	Verified by	Checked by	Approved by
Name and Signature	Name and Signature	Name and Signature	HOD
Name: Dr. A. K.Vidya Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K.Vidya Signature:

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
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Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	17UAPAL610	Title: ADVANCED LEARNERS COURSE IV - ENTREPRENUERSHIP DEVELOPMENT IN LIFE SCIENCES AND HEALTHCARE	Batch:	2017 - 18 Onwards
			Semester:	VI
Hours/Week:	Self - Study		Credits:	2

Objectives

- To introduce the concepts of innovation and entrepreneurship within the life science sector.
- To establish a healthcare or life sciences business by, among other things, working as part of a mentored group to craft and defend a business plan based on an actual technology or service in the space (defined as therapeutics, diagnostics, medical devices, or healthcare IT services).
- Also creates a basis for the rest of the programme regarding the pedagogic model and the learning activities.

Course Outcomes

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

K1	CO1	Acquire sound knowledge about general support of Entrepreneurship.
K2	CO2	Explain the marketing plan and surveys.
K3	CO3	Gain an idea about the mushroom cultivation.
K4	CO4	Understand the significance of vermicompost and Organic Terrace farming
K5	CO5	Get a fundamental knowledge with the methods of aquaculture and sericulture

Syllabus

Unit	Content	Hours
I	Entrepreneurship – Introduction, Management, Character and Need of entrepreneurs. Factors affecting entrepreneurship, Establishment of a Small business, Identification of sound Enterprise, Project Proposal Designing (Raw material, Technology, Skill and Data management), Infrastructure and Policy support forEntrepreneurship.	-
II	Marketing plan, Market survey, Methods of data collection, Forecasting market demand, Sustainability of enterprise, Technical appraisal - factors for personal training. Financial appraisal - estimation of financial requirement, financial viability and Cost benefit analysis, Preparation of balance sheet. Funds - types and approaches. Project formulation, Project description, Physical infrastructure, Plant layout, Pollution control, Communication system, Transportation, Requirement of machinery and equipment, Licensing procedures and tax assessment	-

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III	**Mushroom cultivation:** Types of Mushroom – Edible and toxic, Preparation of Spawn. Preparation of bed – Sterilization, Straw preparation. Environmental conditions to be monitored. **Spirulina:** Biology of Spirullina. Growth and culture conditions. Nutritive value of Spirulina. Enhancement of Spirullina nutrients and processing. Commercial Spirullina products, Marketing.	-
IV	**Vermicompost:** Earthworms used in vermicomposting, Culture conditions and raw materials for compost. Vermiwash, Packaging. Panchakavya - Preparation, importance, medicinal uses, marketing. **Organic Terrace farming:** General Recommendations, Requirements, Significance and Marketing.	-
V	**Aquaculture:** Pearl culture – Types, Pearl enhancement conditions, Harvesting, Economical importance. Fisheries – Shrimp culture, Prawn culture, Ornamental fishes, Nutritive value of fish. **Sericulture:** Introduction, Biology and Characteristics of Silkworm - Types, Nutrients, Cultural conditions. **Bee rearing:** Types of Honeybees, Biological properties of Honey, Types of Apiculture and environmental factors.	-
	TOTAL	-

Teaching Methodology: Self - Study

Books for Study:

1. Small scale Industries and Entrepreneurship by VASANT DESAI, Himalaya Publishing House.

Books for Reference:

1. Dr. Vishwanath, "A Handbook of Organic Terrace Gardening", May 2008.

Course Designed by	Verified by	Checked by	Approved by
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Name: Dr. A. K.Vidya Signature:	Name: R. Rasu Signature:	Name: S. Natarajan Signature:	Name: Dr. A. K. Vidya Signature:

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