HAJEE KARUTHA ROWTHER HOWDIA COLLEGE

(An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai.)
Re-Accredited with A++ Grade by NAAC (3rd Cycle)
Uthamapalayam - 625 533.

DEPARTMENT OF

BIOCHEMISTRY

PART IV - BIOCHEMISTRY

SYLLABUS

Choice Based Credit System – CBCS

(As per TANSCHE)

With

Outcome Based Education (OBE)

(Academic Year 2023 -2026)

Semester-I

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23UBCSE11	Health and Nutrition (NME)	2	25	75	100	2
	23UBCFN11	Basic Concepts in Biochemistry.	2	25	75	100	2

Semester-II

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23UBCSE21	Life Style Diseases (NME)	2	25	75	100	2
	23UBCSE22	First Aid	2	25	75	100	2

Semester-III

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23UBCSE31	Biomedical Instrumentation	1	25	75	100	1
	23UBCSE32	Medical Laboratory Technology	2	25	75	100	2
	23UGEVS41	Environmental Studies	1	-	-	-	-

Semester-IV

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23UBCSE41	Medical Coding	2	25	75	100	2
	23UBCSE42	Tissue Culture	2	25	75	100	2
	23UGEVS41	Environmental Studies	1	25	75	100	2

Semester-V

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23UGVED51	Value Education	2	25	75	100	2
	23UBCIS51	Internship / Industrial Training	-	-	-	-	2

Semester-VI

Course Category	Course Code	Course Title	Hrs	CIAE	TEE	Max Marks	Credits
Part – IV	23UBCSE61	Microbial Techniques	2	25	75	100	2

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE11	HEALTH AND NUTRITION (NME)	NME	2	2	25	75	100

Learning Objectives		
L1	Gain basic knowledge about health	
L2	Understand about vitamins.	
L3	Learn about functions of fat on health.	
L4	Understand the types of minerals and its functions	
L5	Know about the importance of carbohydrates and proteins on health	
UNIT	**Contents**	**No. of Hours**
I	Health – definition, Factors affecting human health. Importance of health care of children, adults and elderly people. Balanced diet and calorific value.	6
II	Vitamins-definition, classification, sources, properties, functions and deficiency symptoms. Recommended daily allowances.	6
III	Sources and functions of dietary fats, role of fats in health and diseases.	6
IV	Minerals- Role of minerals on human health, sources, biological functions, deficiency disorders with special reference to Calcium, Phosphorus, Potassium, Copper, Iron, Zinc and Selenium. Minerals in biological systems and their importance –Iron, Calcium, Phosphorus, Iodine, Copper, Zinc.	6
V	Role of proteins and carbohydrates in health. Functions of protein and carbohydrate and their calorific value. Dietary sources and deficiency disorders – Kwashiorkor and Marasmus – supplementation programs in India and their implications.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Understand about the importance of health and diet	K1,K2,K3,K4
2	Discuss about the classification properties and deficiencies of vitamins	K1,K2,K3,K4,K5,K6
3	Understand about sources and functions of fats and lipids on health	K1,K2,K3,K4,K5,K6
4	Detail about the different typed of minerals and its role in health	K1,K2,K3,K4,K5,K6
5	Relate the role of proteins and carbohydrates on health	K1,K2,K3,K4,K5

Textbooks	
1.	Principles of Nutrition and Dietetics, M. Swaminathan, Bappco, 1995.
2.	Nutritional Biochemistry, Tom Brody, 2nd edition, Academic press, USA, 1998.
3.	Human nutrition and dietetics, Garrow JS, James WPT and Ralph A, 10th edition,

	Churchill Livingstone, 2000.

Reference Books	
1.	Food Fundamentals, Margaret Mc Williams, 10th edition, Prentice Hall, 2012.
2.	Nursing Manual of Nutrition and Therapeutic Diet, Indrani TK, 1st edition Jaypee Brothers medical publishers, 2003.
3.	Biochemical, Physiological, and Molecular Aspects of Human Nutrition, Martha H. and Marie A, 3rd edition, Chand Publishers, 2012.
4.	Nursing Manual of Nutrition and Therapeutic Diet, Indrani TK, 1st edition Jaypee Brothers medical publishers, 2003.
Web Resources	
1.	Energy-Yielding Nutrients | Overview & Types - Lesson | Study.com
2.	Food and nutrition - Healthy living | NHS inform
3.	FINAL-231-250.pdf

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	3	3	2	3	3
CO 4	3	3	3	2	3	3
CO 5	3	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCFN11	BASIC CONCEPTS IN BIOCHEMISTRY	FC	2	2	25	75	100

Learning Objectives		
L1	Basic knowledge on solution and its preparation.	
L2	Understand the importance of pH and buffer in Biochemistry.	
L3	Understand the foundation of evolution of living organism.	
L4	Study the plant system and its organisation.	
L5	Study the human system and its organisation.	
UNIT	**Contents**	**No. of Hours**
I	**Solutions:** Definition of solution – Types of solutions – Concentration of the solution – Mass percentage – Volume percentage – Mass by volume percentage – Part per million- Mole fraction – Normality – Molarity – Molality. (problem included).	6
II	**Basics of Experimental Biochemistry:** Accuracy and precision - Acids & Bases – pH and its measurement – Buffers – Preparation and characteristics of Buffer.	6
III	**Evolution:** Origin of life – Evidence for evolution – Evolution of organism – Human evolution - Darwin's theory.	6
IV	**Plant system:** Plants- types of plants – Plant organ system – Plant tissue and its types – Introduction to Photosynthesis.	6
V	**Human system**: Human body organisation – over view of human organ system – Tissues and its types – Different types of cell in human body – Introduction to metabolism.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Aquaria knowledge to prepare and calculate the strength of solutions with different concentration.	K1,K2,K3,K4
2	Understand the importance of pH and Buffer solution in chemical and biological reactions	K1,K2,K3,K4,K5,K6
3	Discuss scientifical hypothesis in origin and evolution of life on earth.	K1,K2,K3,K4,K5,K6
4	Differentiate the organ system of plant and it autotropic character	K1,K2,K3,K4,K5,K6
5	Enumerate the different human organ system and their role in metabolism	K1,K2,K3,K4,K5

Textbooks	
1.	Chemistry, grade 11 NCERT text book, 2022, New Delhi.
2.	Biology, grade 11 NCERT text book, 2022, New Delhi.
3.	Biochemistry, U. Sathyanarayana & U. Chakrapani, 4th edition, Elsevier India Pvt.

	Ltd., 2015.
4.	Text Book of Medical Biochemistry M.N. Chatterjee and Rana Shinde, 8th edition, JAYPEE, New Delhi, 2012.
Web Resources	
1.	https://ncert.nic.in/textbook.php?kech1=0-6
2.	https://ncert.nic.in/textbook.php?kebo1=0-19

Mapping with Program Outcomes

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	2	2	2	2	2
CO 2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2
CO 4	2	2	2	2	2	2
CO 5	2	2	2	2	2	2

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE21	LIFE STYLE DISEASES (NME)	NME	2	2	25	75	100

Learning Objectives		
L1	Create awareness on lifestyle diseases among adolescents.	
L2	List out the lifestyle diseases.	
L3	Explain the common lifestyle diseases and their prevention.	
L4	Acquaint the disorders associated with women's health.	
L5	Impart life skills so as to prevent life style diseases.	
UNIT	**Contents**	**No. of Hours**
I	**Life style diseases:** Definition, Factors contributing to lifestyle diseases – Physical inactivity, Poor food habits, disturbed biological clock, sleep deprivation.	6
II	Top lifestyle diseases, Impact of Lifestyle diseases on family, society and economy of country.	6
III	Causes, symptoms, types, preventive measures and treatment of Obesity, cardiovascular diseases, diabetes and cancer.	6
IV	Women's lifestyle diseases: Polycystic Ovarian Disease, Infertility, Breast and cervical cancer and Osteoporosis.	6
V	Prevention of lifestyle diseases: Balanced diet, sufficient intake of water, physical activity, sleep-wake cycle, stress management and meditation.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Define Lifestyle diseases and describe the contributing factors	K1,K2,K3,K4
2	Enumerate the top life style diseases and its impact on life.	K1,K2,K3,K4,K5,K6
3	Elaborate the treatment and prevention measures of common lifestyle diseases.	K1,K2,K3,K4,K5,K6
4	Highlight the life style diseases that affects the women's health	K1,K2,K3,K4,K5,K6
5	Illustrate the various measures for prevention of life style diseases	K1,K2,K3,K4,K5

Textbooks	
1.	Lifestyle Medicine, JamesM R, 2nd edition, CRC Press, 2013.
2.	New Frontiers in Lifestyle-Related Disease, Akira Miyazaki, Springer,2008
Reference Books	
1.	Disease Control Priorities in Developing Countries. 2nd edition. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; 2006.
2.	Guide to prevention of lifestyle diseases, Kumar M & R. Kumar, Deep & Deep

	publications, 2003.
Web Resources	
1.	Immunotherapy: How the Immune System Fights Cancer
2.	LIFESTYLE DISEASES: Keeping fit for a better tomorrow - PMC
3.	Home Science (Eng) Ch-8.pdf

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	3	3	3	3
CO 2	2	3	3	2	3	3
CO 3	2	3	3	2	3	3
CO 4	2	3	3	2	3	3
CO 5	2	3	3	2	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE22	FIRST AID	SEC	2	2	25	75	100

Learning Objectives		
L1	Provide knowledge on the basics of first aid.	
L2	Perform first aid during various respiratory issues.	
L3	Demonstrate the first aid to treat injuries.	
L4	Learn the first aid techniques to be given during emergency.	
L5	Familiarize the first aid during poisoning.	
UNIT	**Contents**	**No. of Hours**
I	Aims and important rules of first aid, dealing with emergency, types and content of a first aid kit. First aid technique – Dressing and Bandages, fast evacuation technique, transport techniques.	6
II	Basics of Respiration – CPR, first aid during difficult breathing, drowning, choking, strangulation and hanging, swelling within the throat, suffocation by smoke or gases and asthma.	6
III	Common medical aid- first aid for wounds, cuts, head, chest, abdominal injuries, shocks, burns, amputations, fractures, dislocation of bones.	6
IV	First aid related to unconsciousness, stroke, fits, convulsions-seizures, epilepsy.	6
V	First aid in poisonous bites (Insects and snakes), honey bee stings, animal bites, disinfectant, acid and alkali poisoning.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Discuss on the rules of first aid, dealing during emergency and first aid techniques	K1,K2,K3,K4
2	Understand the first aid techniques to be given during differe types of respiratory problems	K1,K2,K3,K4,K5,K6
3	Provide first aid for injuries, shocks and bone injury	K1,K2,K3,K4,K5,K6
4	Detail on the first aid to be given for unconsciousness, stroke, fits and convulsions	K1,K2,K3,K4,K5,K6
5	Gain expertise in giving first aid for insect bites and chemical poisoning	K1,K2,K3,K4,K5

Textbooks	
1	First aid and health, Dr. Gauri Goel, Dr. Kumkum Rajput, Dr. Manjul Mungali 1SBN-978-93-92208-19-5
2	Indian First Aid Mannual-https://www.indianredcross.org/publications/FA-manual.pdf
3	Red Cross First Aid/CPR/AED Instructor Manual
Web Resources	

1.	https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online
2.	https://www.firstaidforfree.com/

Mapping with Programme Outcomes

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
CO 1	2	3	3	3	3	3
CO 2	2	3	3	3	3	3
CO 3	2	3	3	3	3	3
CO 4	2	3	3	3	3	3
CO5	2	3	3	3	3	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE31	BIOMEDICAL INSTRUMENTATION	SEC	1	1	25	75	100

Learning Objectives		
L1	Provide insights about the blood pressure and its measurement.	
L2	Elaborate the mechanism of instruments related to respiration.	
L3	Highlight the importance of imaging techniques.	
L4	Acquaint students about the basics of medical assisting devices.	
L5	Familiarize about the life saving therapeutic equipments.	
UNIT	**Contents**	**No. of Hours**
I	**Measurement of blood pressure** - sphygmomanometer. Cardiac output - Cardiac rate - Heart sound - Stethoscope, ECG - EEG - EMG - ERG.	6
II	**Monitoring of inspired/**expired anaesthetic gases, capnograph, inhalators, nebulizers, aspirators, infant respirator, Plethysmography	6
III	**Medical imaging:** X-ray machine - Radio graphic and fluoroscopic techniques - Computed tomography - MRI - PET, Ultrasonography – Endoscopy – Thermography.	6
IV	**Assisting equipments:** Pacemakers - Defibrillators - Ventilators.	6
V	**Therapeutic equipments:** Nerve and muscle stimulators – Diathermy - Heart - Lung machine - Audio meters - Dialyzers.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Illustrate the functions of instruments used for measuring blood pressure.	K1,K2,K3,K4
2	Elaborate the devices required for monitoring of respiratory gases.	K1,K2,K3,K4,K5,K6
3	Understand the operation of the imaging and sonographic instruments.	K1,K2,K3,K4,K5,K6
4	Differentiate between the action of pacemakers , defibrillators and ventilators.	K1,K2,K3,K4,K5,K6
5	Demonstrate the function of therapeutic equipment's	K1,K2,K3,K4,K5

Textbooks	
1.	M.Arumugam, ***'Bio-Medical Instrumentation'***, Anuradha Agencies.
2.	L.A. Geddes and L.E.Baker, ***'Principles of Applied Bio-Medical Instrumentation'***, John Wiley & Sons.
3.	J.Webster, ***'Medical Instrumentation'***, John Wiley & Sons.
4.	C.Rajarao and S.K.Guha, '***Principles of Medical Electronics and Bio-medicalInstrumentation'***, Universities (India) Ltd, Orient Longman Ltd.

Reference Books	
1.	Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, ***'Bio-Medical Instrumentation and Measurements'***, II Edition, Pearson Education, 2002.
2.	R.S.Khandpur, ***'Handbook of Bio-Medical instrumentation'***, Tata McGraw Hill Publishing Co Ltd.,
Web Resources	
1.	https://youtu.be/GkUCmb0cKwo?list=PLCZ9KmODEcu138Il VeHClJ4nskArYr1Dg

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3	3	3	3	2	-	-
CO 2	2	3	3	3	3	2	-	-
CO 3	2	3	3	3	3	2	-	-
CO 4	2	3	3	3	3	2	-	-
CO 5	2	3	3	3	3	2	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	-
CO2	3	3	3	3	-
CO3	3	3	3	3	-
CO4	3	3	3	3	-
CO5	3	3	3	3	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE32	MEDICAL LABORATORY TECHNOLOGY	SEC	2	2	25	75	100

Learning Objectives		
L1	Impart knowledge on specimen collection and disposal of waste.	
L2	Acquaint knowledge on collection, preservation and transfusion of blood.	
L3	Quantify the biomolecules in biological sample	
L4	Understand the significance of various tests and their interpretation in diseased conditions	
L5	Acquaint knowledge on enzymes, hormones and Immunoglobulins as markers for diagnosis.	
UNIT	**Contents**	**No. of Hours**
I	Collection, transport, analysis of specimen - blood, routine urine, feces, sputum, semen, CSF Documentation of samples & results. Disposal of laboratory/ hospital waste - Non-infectious waste, biomedical waste, infected sharp waste disposal, infected non sharp disposal - color coding as per guidelines.	6
II	Determination of Blood group and Rh factor - Basic blood banking procedures - cross matching, screening test. Blood transfusion and hazards.	6
III	Estimation of blood sugar - Enzymatic method, HbA1C, Qualitative and quantitative analysis of urine sample – NPN - urea, uric acid, creatinine. Mineral, vitamin and CSF analysis.	6
IV	Immuno diagnostics - Widal test, VDRL test, ASO, RA, CRP and Complement Fixation Test. RIA, ELISA, Skin test - Montaux and Lepramin test.	6
V	Assay of clinically important enzymes - Estimation of clinically important hormones - Insulin, Thyroid and Reproductive hormones and its clinical significance	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Collect & preserve of biological samples.	K1,K2,K3,K4
2	Estimate the various constituents in biological sample	K1,K2,K3,K4,K5,K6
3	Perform the routine procedures adopted in blood bank	K1,K2,K3,K4,K5,K6
4	Analyze and interpret the values for both normal and disease conditions.	K1,K2,K3,K4,K5,K6
5	Assay the enzymes and hormones &interpret clinical implications	K1,K2,K3,K4,K5

Textbooks	
1.	Kanai L Mukherjee and Anuradha Chakravarthy ***Medical Laboratory Technology*** IV the edition, Vol I,2022

2.	RamnikSood, ***Text Book of Medical Laboratory Technology***, Jaypee Publishers, 2006
3.	Tietz, N. (2018) ***Fundamentals of Clinical Chemistry and Molecular Diagnostics*** 8th edition, W.B. Saunders Company
Reference Books	
1.	Praful B. GODKAR& DARSHAN B. GODKAR ***Text book of Medical Laboratory Technology*** III edition,2021.
2.	F. J Baker, R.E. Silverton. ***Introduction to Medical Laboratory Technology*** Vth edition, 1985
Web Resources	
1.	https://www.youtube.com/watch?v=QNYlX5Ne9lQ
2.	https://www.slideshare.net/doctorrao/ agglutination -tests-and-immunoassys
3.	https://microbenotes.com/introduction-to-precipitation-reaction/

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3	3	1	3	2	-	-
CO 2	2	3	3	1	3	2	-	-
CO 3	2	3	3	1	3	2	-	-
CO 4	2	3	3	1	3	2	-	-
CO 5	2	3	3	1	3	2	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	-
CO2	3	3	3	3	-
CO3	3	3	3	3	-
CO4	3	3	3	3	-
CO5	3	3	3	3	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE41	MEDICAL CODING	SEC	2	2	25	75	100

Learning Objectives		
L1	Understand the basic concept of Medical coding	
L2	Familiarize the student about medical terminology	
L3	Understand about the classification of diseases based on WHO/AHA	
L4	Understand about the CPT code used for diseases as per American Medical Association (AMA)	
UNIT	**Contents**	**No. of Hours**
I	Introduction to Medical coding, coding theory, Healthcare Common Procedure Coding, First Aid and CPR	6
II	Introduction to Medical Terminology, specialization I & II, Diagnostic coding, factors affecting diagnostic coding	6
III	Documenting medical records- Importance of Documentation, Types of dictation formats	6
IV	Introduction to Human Anatomy and Coding, ICD-10- CM classification system	6
V	Introduction to CPT coding, types of CPT coding Medical Law and Ethics.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Explaining the basic concept of coding and its application. Possess the knowledge about the First aid and CPR	K1,K2,K3,K4
2	Possess the knowledge about medical terminology used in Medical coding industry	K1,K2,K3,K4,K5,K6
3	Possess the knowledge about the ICD-10 CM international classification of diseases based on WHO	K1,K2,K3,K4,K5,K6
4	Possess the knowledge about the CPT codes used for diseases as per American Medical Association (AMA)	K1,K2,K3,K4,K5,K6
5	Understand CPT coding and its types	K1,K2,K3,K4,K5

Textbooks	
1.	Understanding ***Medical Coding***, A comprehensive guide SandraL Johnson Robin Linker
2.	Buck's Step – by – step ***Medical Coding*** Elsevier reference
Reference Books	
1.	Terry Tropin M Shai, RHIA, CCS-P, AHIMAICD-10-C ***Mcoding guidelines*** made easy2017.
2.	Besty J Shiland- ***Medical terminology and anatomy for ICD-10.***
Web Resources	
1.	https://www.aapc.com/resources/what-is-medical-

	coding?srsltid=AfmBOopFafoRoTRrRRN4IaiggJ7ha-NCZ6VvbQkqIpETy4kuAFcaGM6W
2.	https://www.datavant.com/medical-coding/medical-coding

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3	1	1	3	3	-	-
CO 2	2	3	1	1	3	3	-	-
CO 3	2	3	1	1	3	3	-	-
CO 4	2	3	1	1	3	3	-	-
CO 5	2	2	1	1	3	2	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	-
CO2	3	2	2	3	-
CO3	3	2	2	3	-
CO4	3	2	2	3	-
CO5	3	2	2	3	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE42	TISSUE CULTURE	SEC	2	2	25	75	100

Learning Objectives		
L1	Introduce the tools and techniques used in tissue culture technique.	
L2	Acquire knowledge on preparation of growth medium for culture techniques.	
L3	Impart knowledge on procedures involved gene transfer.	
L4	Acquaint with the process of tissue culture technique.	
L5	Understand the importance of plant and animal tissue culture for the production and evaluation of bioactive compounds	
UNIT	**Contents**	**No. of Hours**
I	Introduction to Tissue culture, Types- seed, embryo, Callus, Organ, Protoplast culture, Advantages and importance of tissue culture, Tools and techniques	6
II	Media and Culture Preparation - pH, temperature, solidifying agents. Role of Micro and macro nutrients. Maintenance of cultures.	6
III	Methods of gene transfer in plants and animals - direct and indirect gene transfer methods.	6
IV	Cell culture technique - Explants selection, sterilization and inoculation.	6
V	Transgenic plants for crop improvement. Transgenic plants for molecular farming. Animal Cloning - an Overview-Applications of animal cell culture	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	**On completion of this course, students will**	
1	Introduction to plant tissue culture	K1,K2,K3,K4
2	Brief knowledge on preparation of tissue culture media	K1,K2,K3,K4,K5,K6
3	Understanding on different methods of gene transfer	K1,K2,K3,K4,K5,K6
4	Gain knowledge on plant and animal cell culture techniques	K1,K2,K3,K4,K5,K6
5	Study of applications of genetically modified plants and animals.	K1,K2,K3,K4,K5

Textbooks

1. Trivedi, P.C.2000. ***Applied Biotechnology:*** Recent Advances. PANIMA Publishing corporation.
2. Ignacimuthu. 1996. ***Applied Plant Biotechnology***. Tata McGraw – Hill.
3. Lycett, G.W. and Grierson, D. (ed). 1990***. Genetic Engineering of crop plants.***
4. Grierson and Covey, S.N.1988. ***Plant Molecular biology***. Blackie.
5. Chawla, H.S., "***Introduction to Plant Biotechnology"***, 3rd Edition, Science Publishers, 2009.

Reference Books

1.	Gamburg OL, Philips GC, ***Plant Tissue & Organ Culture Fundamental Methods***, arias Publications. 1995.
2.	Stewart Jr., C.N., "***Plant Biotechnology and Genetics: Principles, Techniques and Applications"*** Wiley-Interscience, 2008.
3.	Freshney, R. I. (2010). ***Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications.*** Wiley-Blackwell, 2010.6th Edition.
4.	Davis, J. M. (2008). ***Basic Cell Culture.*** Oxford University Press. New Delhi.
5.	Davis, J. M. (2011). ***Animal Cell Culture***.John Willy and Sons Ltd. USA.6Freshmen R. I. (2005). ***Culture of Animal Cells***. John Willy and Sons Ltd. USA.
6.	Butler, M. (2004). ***Animal Cell Culture and Technology.*** Taylor and Francis. Keywork USA.
7.	Verma, A. S. and Singh, A. (2014). ***Animal Biotechnology***. Academic Press, ELSEVIER, USA
Web Resources	
1.	https://www.britannica.com/science/tissue-culture
2.	https://en.wikipedia.org/wiki/Plant_tissue_culture
3.	https://microbeonline.com/animal-cell-culture-introduction-types-methods-applications/

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3	3	1	2	3	-	-
CO 2	2	3	1	1	2	3	-	-
CO 3	2	3	3	2	2	3	-	-
CO 4	2	3	3	1	2	3	-	-
CO 5	2	3	3	2	2	3	-	-

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	-
CO2	3	3	3	3	-
CO3	3	3	3	3	-
CO4	3	3	3	3	-
CO5	3	3	3	3	-

Strong-3 Medium-2 Low-1

Course Code	Course Title	Category	Credits	Hours	Marks		
					CIAE	TEE	Total
23UBCSE61	MICROBIAL TECHNIQUES	SEC	2	2	25	75	100

Learning Objectives		
L1	Study the growth of bacteria	
L2	Know the parts & uses of microscope	
L3	Learn staining methods to identify microbes	
L4	Learn different types of culture methods	
L5	Study food preservation methods	
UNIT	**Contents**	**No. of Hours**
I	Growth of bacteria- Definition, growth phases, factors affecting growth (pH, temperature, and oxygen), cell count (hemocytometer, Bacterial cell- Bacillus subtilis), fungal cell (Saccharomyces) and human blood cell.	6
II	Microscopy- Principle, types - Compound microscope, electron microscope- TEM, SEM, use of oil immersion objective.	6
III	Stains and staining- Principles of staining, simple staining, negative staining, Differential staining, Gram and acid-fast staining, flagella staining, capsule and endospore Staining. Staining of yeast (methylene blue), lacto phenol cotton blue, staining of mold (Penicillium, Aspergillus), Agaricus.	6
IV	Cultivation of bacteria– Types of growth media (natural, synthetic, complex, enriched, selective- definition with example), culture methods (streak plate, spread plate, pour plate, stab culture, slant culture, liquid shake culture, anaerobiosis) - aerobic and Anaerobic bacteria.	6
V	Food microbiology- Microbiological examination of food: microscopic examination and culture, phosphatase test of Pasteurized milk. Preservation of food- High temperature (boiling, pasteurization, appreciation), low temperature (freezing), dehydration, osmotic pressure, chemical preservations, radiation. Microorganisms as food SCP.	6
	Total	**30**

Course Outcomes		Knowledge Level
CO	On completion of this course, students will	
1	Understand the growth of bacteria and to perform cell count	K1,K2,K3,K4
2	Acquire knowledge of microscope and its uses	K1,K2,K3,K4,K5,K6
3	Identify the microbes by staining methods	K1,K2,K3,K4,K5,K6
4	Culture microbes by various methods	K1,K2,K3,K4,K5,K6
5	Preserve foods at high and low temperature	K1,K2,K3,K4,K5

Textbooks	
1.	Sherris Medical Microbiology, 7th Edition by Authors: Kenneth Ryan, C. George Ray, Nafees Ahmad, W. Lawrence Drew, Michael Lagunoff, Paul Pottinger, L. Barth Reller and Charles R. Sterling

2.	Food Microbiology: Fundamentals And Frontiers, 5th Edition by Editor(s):Michael P. Doyle, Francisco Diez-Gonzalez, Colin Hill
3.	Text book of microbiology by Ananthanarayan and Panicker's
4.	Textbook of microbiology by P.C. Trivedi Sonali Pandey Seema Bhadauria5. 5.Prescott's Microbiology, 10th Edition by Authors: Joanne Willey, Linda Sherwood and Christopher J. Woolverton
Reference Books	
1.	Bailey& Scott's Diagnostic Microbiology, 14th Edition by Author: Patricia Title
2.	Medical Microbiology, 7th Edition Authors: Patrick R. Murray, Ken S. Rosenthal and Michael A. Pfaller
3.	Microbiology: Laboratory Theory and Application, 3rd Edition Authors: Michael J. Leboffe and Burton E. Pierce
Web Resources	
1.	https://bio.libretexts.org/Courses/North_Carolina_State_University/ MB352_General_Microbiology_Laboratory_2021_(Lee)/04%3A_ Staining_Techniques/4.01%3A_Introduction_to_Staining
2.	https://nduat.org/Doc/cultivation-of-bacteria-.pdf
3.	https://microbenotes.com/category/food-microbiology/

Mapping with Programme Outcomes:

CO /PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	3	2	3	2	3	2	3
CO 2	2	3	2	3	2	3	2	3
CO 3	2	3	2	3	2	3	2	3
CO 4	2	3	2	3	2	3	2	3
CO 5	2	3	2	3	2	3	2	3

Strong-3 Medium-2 Low-1

Level of Correlation between PSO's and CO's

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2
CO2	3	3	3	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	2

Strong-3 Medium-2 Low-1