INTEGRAL UNIVERSITY, LUCKNOW

INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

BACHELOR OF SCIENCE IN CARDIOVASCULAR TECHNOLOGY
(B.Sc. CVT) SYLLABUS

YEAR/ SEMESTER: II/III

Integral University, Lucknow
Department of Paramedical Sciences
Study and Evaluation Scheme

Program: B. Sc. Cardiovascular Technology — Semester-III

S. N.	Course code	Course Title	Type of Paper	Period Per hr/week/sem			Evaluation Scheme				Sub. Total	Credit	Total Credits
				L	T	P	CT	TA	Total	ESE			
THEORIES													
1	CV201	Clinical Hematology - I	Core	2	1	0	40	20	60	40	100	2:1:0	3
2	CV202	Microbiology	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	CV203	Pharmacology	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	CV204	Medical Biochemistry -II	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	CV205	Basics of Cardiovascular Technology	Core	2	1	0	40	20	60	40	100	2:1:0	3
6	ES101	Environmental Studies	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	CV206	Clinical Hematology - I Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	CV207	Medical Biochemistry -II Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
3	CV208	Basics of Cardiovascular Technology Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
Total				**12**	**06**	**12**	**360**	**180**	**540**	**360**	**800**	**24**	**24**

S. N.	Course code	Course Title	Type of Paper	Attributes							United Nation Sustainable Development Goal (SDGs)
				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
THEORIES											
1	CV201	Clinical Hematology - I	Core	√	√	√	√		√	√	3,4
2	CV202	Microbiology	Core	√	√	√	√		√	√	3,4
3	CV203	Pharmacology	Core	√	√	√	√		√	√	3,4
4	CV204	Medical Biochemistry -II	Core	√	√	√	√		√	√	3,4
5	CV205	Basics of Cardiovascular Technology	Core	√	√	√	√		√	√	3,4
6	ES101	Environmental Science	Core			√		√			3,4
PRACTICAL											
1	CV206	Clinical Hematology - I Lab	Core	√	√	√	√		√	√	3,4
2	CV207	Medical Biochemistry -II Lab	Core	√	√	√	√		√	√	3,4
3	CV208	Basics of Cardiovascular Technology Lab	Core	√	√	√	√		√	√	3,4

L: Lecture **T:** Tutorials **P:** Practical **CT:** Class Test **TA:** Teacher Assessment **ESE:** End Semester Examination,
AE= Ability enhancement, DSE- Discipline Specific Elective, **Sessional Total:** Class Test + Teacher Assessment **Subject Total:** Sessional Total + End Semester Examination (ESE)

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV201**	**Title of the Course**	**CLINICAL HAEMATOLOGY- I**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	III	**2**	**1**	**0**	**3**
Pre-Requisite	10+2 with Biology	**Co-requisite**	Nil				
Course Objectives	The hematologycurriculumaimstopreparestudentsinbasicunderstandingofcomposition of blood. Students would also be introduced to laboratory waste management protocols, instrumentation, techniques and methods of estimating different parameters of blood. The academic emphasis of this module is that students would learn basic hematological techniques including blood coagulation tests, blood banking and automation.						

Course Outcomes	
CO1	Students will be able to receive process and preserve the tissue samples and can efficiently about the RBCs. Structure and function
CO2	Students will be able to receive process and about the Anemia.
CO3	Students will be able to receive process of the Anemic Disease.
CO4	Students will be able to receive process and preserve the tissue samples and can efficiently perform Anemia of Diminished Erythropoiesis.
CO5	Students will be able to receive process and preserve the Hemolytic anemia.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**BLOOD**	Structure and metabolism of RBCs. Structure of normal hemoglobin and its metabolism. Variation of size and shape.	6	CO1
2	**ANEMIA**	Definition of Anemia and its classification (Morphological and etiological) pathogenesis, laboratory investigations in a case of anemia.	6	CO2
3	**ANEMIC DISEASE**	Anemia of blood loss - acute and chronic.	6	CO3
4	**ANEMIA OF DIMINISHED ERYTHROPOIESIS**	**Anemia of Diminished erythropoiesis:** Iron deficiency anemia - pathogenesis, and laboratory investigations. Principle and procedure of special tests - Estimation of iron, TIBC, Transferrin Ferritin, Plasma hemoglobin, Perls Prussian blue staining. Macrocytic anemia - pathogenesis, and laboratory investigations of Megaloblastic anemia, pernicious anemia, pathogenesis, clinical features, laboratory investigations, test for Vit.B12, Folic acid, FIGLU test and Schilling test.	6	CO4
5	**HEMOLYTIC ANEMIA**	Features of Hemolytic anemia (extra vascular and intra vascular hemolysis). Hemolytic anemia of non-immune origin Sickle cell anemia, sickle cell trait, pathogenesis, clinical features, laboratory investigations. Principle and procedure of special test, Sickling test. Briefly about G-6-PD deficiency disease, tests for diagnosis, Hereditary spherocytosis and test for diagnosis (Osmotic fragility test, Heinz bodies). Immune-hemolytic anemia.	6	CO5

Reference Books:

1. Mukherjee .L. K(2017), Medical Laboratory Technology,Vol.1-3,3rd edition, Tata Mc-graw Hill..
2. SoodRamnik,(2015), Text book of Medical Laboratory Technology,2nd edition, Jaypee Publications.
3. Wintrobe's Clinical Haematology,(2014),13th edition, Lippincott Williams &Wilkins.
4. De Gruchy's Clinical Haematology in Medical Practice,(2012),Sixth edition,Wiley Publications.
5. Dacie& Lewis Practical Haematology, (2011),11thedition, Elsevier Publications.

e-Learning Source:

1.https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt

2.https://www.ucsfhealth.org/medical-tests/semen- analysis#:~:text=Semen%20analysis%20is%20one%20of,have%20a%20male%20infertility%20problem.

3.https://www.youtube.com/watch?v=wZCKrseSIOE

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1
CO2	1	3	1	3	-	-	-	1	3	-	-	3	-	2	-	2	-	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	-	1	-	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV201	CLINICAL HAEMATOLOGY- I	√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV202**	**Title of the Course**	**MICROBIOLOGY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**2**	**1**	**0**	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This subject gives a general insight into the history, basics of microbiology and imparts knowledge about equipment used in microbiology.						

Course Outcomes	
CO1	This course makes the students to know handling of instruments and sterilization techniques.
CO2	This course makes the students to know general insight into the history, basics of microbiology.
CO3	This course makes the students to know imparts knowledge about equipment used in microbiology.
CO4	This course makes the students to know Structure, function and chemical composition of bacterial cell membranes.
CO5	This course makes the students to know Biomedical waste management in a Medical Microbiology laboratory: Types of the waste generated, Segregation, Treatment, Disposal.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**INTRODUCTION ANDHISTORY OF MICROBIOLOGY**	• Development of microbiology as a discipline, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Edward Jenner. • Introduction to bacterial taxonomy, Classification of Bacteria, Morphology based on size, shape, arrangement, motility, flagella, spores, capsules, cell wall, plasma membrane, pili, ribosomes.	6	CO1
2	**MICROSCOPY**	• Microscopy: Study of compound microscope– magnification, numerical aperture resolution and components of microscope. • Dark ground illumination, care of microscope and common difficulties micrometry. • Bright Field Microscope, Dark Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Transmission Electron Microscope, Scanning Electron Microscope, Confoca Microscope.	6	CO2
3	**STRUCTURE OF BACTERIA**	• Cell size, shape and arrangement, cell-wall, composition and detailed structure of Gram-positive and Gram-negative cell walls, Cell Membrane. • Structure, function and chemical composition of bacterial cell membranes. • Cytoplasm: Ribosome, mesosomes, inclusion bodies, nucleoid, chromosome and plasmidsEndospore: Structure, formation, Bacterial Genetics.	6	CO3
4	**STERILIZATION AND DISINFECTION**	• General safety measures used in Microbiology laboratory. • Sterilization and disinfection: Various physical methods of sterilization heat. • UV radiation, ionizing radiation, filtration, characters affecting sterilization, auto clave control and sterilization indicators. • Biomedical waste management in a Medical Microbiology laboratory: Types of thewaste generated, Segregation, Treatment, Disposal, PPE & infection prevention Control.	6	CO4
5	**ANTISEPTICS AND DISINFECTANTS**	• Antiseptics & Disinfectants: Definition, types and properties, mode of action, use, qualities of good disinfectants. • Chemical disinfectants – phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compound use and abuse of disinfectants. precautions while using the disinfectants, Testing of disinfectants.	6	CO5

Reference Books:

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.
2. BrooksG.F.,CarrollK.C.,ButelJ.S.,MorseS.A.andMietzner,T.A.(2013).
3. Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
4. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harleyand Klein's Microbiology. 9th edition. McGraw Hill Higher Education.
5. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, NewYork.

e-Learning Source:

1. https://www.babcock.edu.ng/oer/lecture_notes/mlsc/MLSC%20417%20HISTORY%20OF%20MICROBIOLOGY.ppt
2. https://www.tru.ca/_shared/assets/Microbiology_Lab_Safety39696.pdf
3. https://www.healthline.com/health/what-is-antiseptic

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	-	-	2	3	1	2	3	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	3	-	1	2	-
CO3	1	3	1	2	-	-	-	1	2	-	-	2	2	2	1	2	2
CO4	1	3	1	2	-	-	-	1	3	1	-	3	2	3	1	3	2
CO5	1	3	1	2	-	-	-	1	2	2	-	2	3	1	2	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV202	MICROBIOLOGY	√	√	√	√		√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV203**	**Title of the Course**	**PHARMACOLOGY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**3**	**1**	**0**	**4**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	The course will provide training in general pharmacology with special emphasis on common drugs used, routes of ministration, types of formulations, dose and frequency of administration, side effects and toxicity, management of toxic effects, drug interactions, knowledge of chemical and trade name, importance of manufacturing and expiry dates and instructions for handling of drugs.						

Course Outcomes: After the successful course completion, learners will develop following attributes:	
CO1	General Pharmacology & ANS: Possess a relevant knowledge in basic principles of pharmacology and its recent advances.
CO2	Autacoids, PNS & Resp. System: Understand the basic pharmacology of common drugs used, their importance in the overall treatment including Physiotherapy.
CO3	CVS, GIT & Miscellaneous: Understand the general principles of drug action and the handling of drugs by the body.
CO4	CNS & Hormones: Understand the contribution of both drug and physiotherapy factors in the outcome of treatment
CO5	Anti - Microbial Agents: Learn the various drugs such as Anti-leprotic& Anti-fungal Drugs, Anti-malarial Drugs, Anti-tubercular Drugs

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**GENERAL PHARMACOLO GY**	Introduction to pharmacology-various terminologies-sources & routes of drug administration-Absorption & Factors modifying drug absorption – Distribution of drugs- Metabolism: Phase II, - Excretion: routes, modes & kinetics of elimination-Excretion- Mechanism of drug action in brief, synergism & antagonism and Factors modifying drug action-Adverse drug reactions-ADR reporting & monitoring – Drug interactions.	8	CO1
2	**CENTRAL NERVOUS SYSTEM & RESPIRATORY SYSTEM**	Introduction to CNS and Neurotransmitters, drugs used in insomnia, Sedatives and hypnotics-diazepam-alprazolam, anti-anxiety drugs, Antiepileptic-phenytoin, carbamazepine, sodium valproate, General Anesthetics – halothane, isoflurane, sevoflurane – Local Anesthetics – lignocaine – list of other drugs, Alcohols – ethyl alcohol –disulfuram, Anti parkinsonians – levodopa – carbidopa, Opioids – morphine – naloxone – tramadol – pentazocine, NSAIDs –aspirin – diclofenac – ibuprofen – paracetamol – Cox 2 inhibitors. Drugs used in bronchial asthma and cough	8	CO2
3	**CARDIO VASCULAR SYSTEM & BLOOD**	Drugs used in ischemic heart disease-nitrates-Calcium channel blockers-nifedipine, verapamil-list of other drugs – Beta blockers – propronolol, atenolol – metoprolol and antiplatelets – aspirin, clopidogrel, and names of other drugs-fibrinolytic drugs-streptokinase and other drugs, Drugs used in CCF-digoxin and list of other drugs useful in CCF, Shock. Diuretics: 4 groups – Thiazides, Loop diuretics, Potassium sparing and osmotic diuretics. Hypertension – outline of drugs used in hypertension, Rennin angiotensin system – ACE inhibitors – captopril, ramipril and names of other drugs – Receptor antagonist – losartan and list of other drugs, Antiarrhythmic drugs- classification – Quinidine, Lignocaine and amiodaron – Drugs for Hypercholesterolemia – statins. Drugs for anemia – oral & parenteral iron preparations, folic acid, vit B12 and erythropoietin. Coagulants and anticoagulants	8	CO3
4	**HORMONES AND GIT**	Contraceptives – oral and injectable, Corticosteroids – glucocorticoids – hydrocortisone-prednisolone-dexamethasone and names of topical steroids – Insulin – Oral hypoglycemic –sulphonyl urea's, biguanides and others, Thyroid and Antithyroid drugs, Sex Hormones-Estrogen and antiestrogens, Progestin and Anti progestin's, Androgen And anti-androgens. Emetics and anti-emetics-metoclopramide and domperidone, Drugs used in peptic ulcer, constipation-lactulose & Diarrhea-ORS-Loperamide.	8	CO4
5	**CHEMOTHERA PY AND MISCELLANEO US**	**Introduction –** Beta lactum antibiotics: Penicillin's – natural, semi synthetic penicillin's – amoxicillin – cloxacillin-clauvulinic acid – sulbactum – Cephalosporin's – cephalexin – cefuroxime – cefixime –ceftrioxone-cefipime, Broad spectrum antibiotics – Doxycycline – chloramphenicol-imipenum-Macrolides – erythromycin, azithromycin and others – Quinolones- ciprofloxacin and list of other drugs and sulfonamides- cotrimoxazole-Amino glycosides-gentamycin, amikacin and names of other drugs Anti TB-first line drugs, Anti leprosy-dapsone and clofazimine Anti-malarial- chloroquine-mefloquine and artemisinins, Anti-fungal- amphotericin B-fluconazole and topical drugs & Anti viraldrugs- acyclovir and anti-HIV, Anti protozoals- metronidazole – Anthelmintics- albendazole-praziquantel. **Anti-cancer drugs-Introduction** – Anti metabolites- methotrexate- 6 mercapto purine- Alkylating agents-cyclophosphamide- busulphan and cisplatin – Plant products- vinblatin- vincristine-taxanes, antibiotics-actinomycin D- monoclonal antibodies. Immuno modulators- cyclosporine, tacrolimus, azathioprine and steroids.	8	CO5

Reference Books:

1. Dr. K.D. Tripathi Jaypee, Essential of Medical Pharmacology, Brothers Medical Publishers.
2. Gaddum Gaddum's Pharmacology
3. Dr. R.S. Satoskar & Dr. S.D. Bhandarkar, Pharmacology & Pharmacotherapeutics Revised 19th Edition 2005 by Popular Prakashan
4. Krantx, &Carr, Pharmacology principle of Medical practice, Williams &Wilkins.
5. Goodman Pharmacological basis of Therapeutics, L. S. Gilman A

e-Learning Source:

1. https://youtu.be/a0lWFQvQKw8
2. https://youtu.be/qhiMmNZjHRg
3. https://youtu.be/-znHCAu5OnY
4. https://youtu.be/t2tKyjj7u5Y

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	-	-	-	-	-	-	-	-	1	3	-	1	-	2
CO2	3	3	-	-	-	2	-	-	-	-	-	-	3	3	2	3	3
CO3	2	3	-	-	-	2	-	-	-	-	-	1	3	2	1	3	2
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	3	2	2	3
CO5	3	3	-	-	-	3	-	1	-	-	-	-	3	3	2	3	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV203	**PHARMACOLOGY**	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV204**	**Title of the Course**	**MEDICAL BIOCHEMISTRY-II**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**2**	**1**	**0**	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This course deals with fundamentals of metabolism, metabolic disorders, laboratory test and instruments of Clinical Biochemistry.						

Course Outcomes: After the successful course completion, learners will develop following attributes:	
CO1	Students will be able to learn about metabolism of carbohydrates, HMP pathway & ETC
CO2	Students will be able to learn about blood glucose regulation mechanism and its disorder, ex- Diabetes Mellitus
CO3	Students will be able to learn about Proteins and their metabolism.
CO4	Students will be able to learn about Lipids, their structure, metabolic pathways and cholesterol metabolism
CO5	Students will be able to learn about Acid-Base balance mechanism, Blood chemistry profile, various techniques to monitor blood chemistry.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**METABOLISM OF CARBOHYDRATES**	Introduction of Metabolism, Metabolism of Carbohydrates: Glycolysis, TCA cycle, Gluconeogenesis, Glycogenesis, Glycogenolysis, Hexose monophosphate Pathway. Biological Oxidation and Electron Transport Chain.	6	CO1
2	**DIABETES MELLITUS**	Blood glucose homeostasis and its regulation, Insulin, glucagon, C- peptide. Diabetes mellitus, types, clinical features, diabetic profile test, HbA1C, Fructosamine, GTT, Glycosuria, Hyperglycemia and Hypoglycemia.	6	CO2
3	**PROTEINS**	Metabolism of Proteins: Formation of ammonia, Transamination, Deamination, Urea, Cycle, Significance of Urea cycle, metabolism of Aromatic and Branched chain amino acids, Aminoaciduria.	6	CO3
4	**LIPID**	Metabolism of Lipids: Fatty acid synthesis, Beta oxidation of fatty acids, Ketone bodies and ketosis, Cholesterol metabolism, metabolism of Lipoproteins, Lipid profile, Hyperlipidemia, Dyslipidemia and Atherosclerosis.	6	CO4
5	**ACID & BASE BALANCE**	1. Acid- Base balance and pH: pH and its Regulation, Metabolic and Respiratory Disorders. 2. Principle, application, calibration and maintenance of colorimeter, Blood Chemistry analyzer, ABG analyzer, Flame photometer, Turbidimetry, Nephelometry.	6	CO5

Reference Books:

1. D M Vasudevan, Text book of Medical Biochemistry,JaypeePublishers.
2. M N Chatterjee&RanaShinde, Text book of Medical Biochemistry, Jayppe Publications.
3. Michael Cox, David L. Nelson, Lehninger Principles of Biochemistry, 7th edition,W.H. Freeman.
4. RanjanaChawla, Practical Clinical Biochemistry: Methods andInterpretations.

e-Learning Source:

1.https://youtu.be/t5DvF5OVr1Y
2. https://youtu.be/gggC9vctvBQ
3. https://youtu.be/ufvZ8bYtyO8
4. https://youtu.be/Q6R4o-oECxs

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	1	-	2	2	1	-	1	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	3	2	-	2	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	3	1	-	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	-
CO5	1	3	1	2	-	-	-	1	2	1	-	2	2	1	-	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV204	MEDICAL BIOCHEMISTRY-II	✓	✓	✓	✓		✓	✓	3,4

Integral University, Lucknow

Effective from Session:2024-25							
Course Code	**CV205**	**Title of the Course**	**BASICS OF CARDIOVASCULAR TECHNOLOGY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**2**	**1**	**0**	**3**
Pre-Requisite	**NIL**	**Co-requisite**	**NIL**				
Course Objectives	Students can understand the Basic concepts of cardiovascular technology. Students can learn about the medical conditions related to the cardiovascular system.						

Course Outcomes	
CO1	To understand the Basic Function of Heart
CO2	To understand the Gross Anatomy and Physiology of the Heart.
CO3	To understand the Non-invasive ECG techniques
CO4	To understand the purpose of ECG machines and related equipment
CO5	To understand the gas administration devices

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**ANATOMY AND PHYSIOLOGY OF HEART AND BLOOD VESSELS**	1. Gross anatomy and physiology of the heart. 2. Systemic and pulmonary circulation, 3. Coronary structure. 4. Chest topography. 5. Surface marking of heart. 6. Conduction system of the heart	**6**	**CO1**
2	**NONINVASIVE ECG**	1. Technique of ECG recording 2. ECG leads system 3. ECG waves, intervals and segments - person, Osborn wave, delta wave, epsilon wave 4. ECG reporting exercise testing	**6**	**CO2**
3	**NONINVASIVE ECHOCARDIOGRAPHY**	1. Introduction and purposes, demonstration of machine parts, 2. Basic windows 3. Echocardiographic views 4. Imaging modes - two-dimensional (2d) imaging, m-mode imaging, doppler imaging, color-flow mapping.	**6**	**CO3**
4	**INVASIVE TECHNOLOGIES**	1. Introduction to Cath labs and biomedical equipment. 2. Radiation safety and protocols. 3. Catheterization of heart and angiography 4. Maintaining sterility and patient care	**6**	**CO4**
5	**GAS ADMINISTRATION DEVICES**	1. Gas administration devices (reducing valves, flow meters and regulators). A) simple oxygen administration devices. 2. Methods of controlling gas flow. 3. Reducing valves, flow meters, restrictors and regulators 4. Selection of device	**6**	**CO5**

Reference Books:

1. A Textbook of Electrocardiography - Goldberger.
2. Nanda's A Textbook of Echocardiography.
3. A Text of Cardiac Catheterization & Interventions. Dr. W. Grossman's D. Baim.
4. A Textbook of Cardiovascular Medicine. Dr. Bruanwald's.
5. A Textbook of Medicine. Davidsons.

e-Learning Source:

1.https://youtu.be/t5DvF5OVr1Y

2. https://youtu.be/gggC9vctvBQ

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO1	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1
CO2	1	3	1	3	-	-	-	1	3	-	-	3	-	2	-	2	-	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	-	1	-	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV205	BASICS OF CARDIOVASCULAR TECHNOLOGY	√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ES101**	**Title of the Course**	**ENVIRONMENTAL STUDIES**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**2**	**1**	**0**	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	The student will be made aware of our environment in general, natural resources, ecosystems, environmental pollution and social issues related to environment.						

Course Outcomes	
CO1	To study about the Environment and the ECO system.
CO2	To study about the Natural Resources.
CO3	To study about Biodiversity and Conservation
CO4	To study Environmental pollution, its policies and practices
CO5	To study Human Population and Environmental Ethics.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**INTRODUCTION TO ENVIRONMENT AND ECOSYSTEMS**	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	6	CO1
2	**NATURAL RESOURCES**	Energy Resources: Renewable and nonrenewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies.	6	CO2
3	**BIODIVERSITY AND CONSERVATION**	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	6	CO3
4	**ENVIRONMENTAL POLLUTION, POLICIES AND PRACTICES**	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment. Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	6	CO4
5	**HUMAN POPULATION AND THE ENVIRONMENT**	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	6	CO5

1. Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd .Bikaner.
2. Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment &security, Stockholm Env, Institute, Oxford Univ, Press 473p.
3. Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai
4. Clark R.S. Marine Pollution, Clanderon Press Oxford(TB).
5. Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill.
6. BharuchaErach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
7. De. A.K. Environmental chemistry Willey EasternLimited.

e-Learning Source:

1. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-I_15.pdf
2. https://juniperpublishers.com/rapsci/pdf/RAPSCI.MS.ID.555586.pdf
3. **https://ourworldindata.org/world-population-growth**

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	1	-	2	-	1	2	-	3
CO2	2	3	2	2	-	-	-	1	3	1	-	3	-	2	1	-	2
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	2	-	3
CO4	2	3	1	2	-	-	-	1	3	-	-	3	-	2	3	-	3
CO5	1	3	1	2	-	-	-	1	2	1	-	2	-	1	2	-	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
ES101	ENVIRONMENTAL STUDIES	√	√	√	√		√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV206**	**Title of the Course**	**CLINICAL HAEMATOLOGY- I LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**0**	**0**	**4**	**2**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	The hematologycurriculumaimstopreparestudentsinbasicunderstandingofcomposition of blood. Students would also be introduced to laboratory waste management protocols, instrumentation, techniques and methods of estimating different parameters of blood. The academic emphasis of this module is that students would learn basic hematological techniques including blood coagulation tests, blood banking and automation.						

Course Outcomes	
CO1	Students will be able to learn about Hemoglobin Detection Technique, Total RBC counting technique, PCV
CO2	Students will be able to learn about Red cell Indices, Blood smear, GBP
CO3	Students will be able to learn about G-6PD, Leucocyte count, ALC techniques
CO4	Students will be able to learn about toxic granulation of neutrophil, PT & NR, APTT
CO5	Students will be able to learn about SICKLE TEST, Plasma HB, Reticulocyte count techniques.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**HEMOGLOBIN DETECTION TECHNIQUE**	1. Determination of hemoglobin by various methods.	60	CO1
2	**TOTAL RBCCOUNTING TECHNIQUE**	2. Determination of Total RBC count.		CO1
3	**PCV**	3. Determination of PCV.		CO1
4	**RED CELL INDICES**	4. Determination of red cell indices.		CO2
5	**BLOOD SMEAR**	5. Demonstration of hypochromic microcytic slide.		CO2
6	**GBP**	6. General blood picture.		CO2
7	**G-6PD**	7. Determination ofG-6-PD.		CO3
8	**LEUCOCYTE COUNT**	8. Differential Leucocyte Count.		CO3
9	**ALC**	9. Absolute leucocyte count.		CO3
10	**NEUTROPHIL**	10. Demonstration of toxic granulation of neutrophil.		CO4
11	**PT & NR**	11. Toperform PT and Calculate INR.		CO4
12	**APTT**	12. Toperform APTT.		CO4
13	**SICKLE TEST**	13. Toperform sickling test.		CO5
14	**PLASMA HB**	14. Determination of Plasma Hemoglobin.		CO5
15	**RETICULOCYTE COUNT**	15. Toperform reticulocyte count.		CO5

Reference Books:

1. Praful B. Godkar: Textbook of Medical Laboratory Technology
2. Dr.RamnikSood: Textbook of Medical Laboratory Technology

e-Learning Source:

1. https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt
2. https://www.ucsfhealth.org/medical-tests/semen-analysis#:~:text=Semen%20analysis%20is%20one%20of,have%20a%20male%20infertility%20problem.
3. **https://www.youtube.com/watch?v=wZCKrseSIOE**

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-
CO2	1	3	1	3	-	-	-	1	3	-	-	3	-	2	-	2	-
CO3	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	-	1	-
CO5	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV206	CLINICAL HAEMATOLOGY- I LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV207**	**Title of the Course**	**MEDICAL BIOCHEMISTRY- II LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**0**	**0**	**4**	**2**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This course deals with fundamentals of metabolism, metabolic disorders, laboratory test and instruments of Clinical Biochemistry.						

Course Outcomes	
CO1	Students will be able to learn about Picratemethod, Benedict's/ Uristixmethod
CO2	Students will be able to learn about Rothera Nitroprussidetest, Serum Amylase, Serum Lipase estimation
CO3	Students will be able to learn about Malloy–Evelyn method, BCG method
CO4	Students will be able to learn about Uricase/ PAP method
CO5	Students will be able to learn aboutSemi Autoanalyzer, Flame Photometer

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**PICRATE METHOD.**	1. Estimation of Serum Creatinine by Alkaline Picrate method.	60	CO1
2	**BENEDICT'S/ URISTIX METHOD**	2. Toperform urine sugar by Benedict's/ Uristix method.		CO1
3	**ROTHERA NITROPRUSSIDE TEST**	3. Toperform urine Ketone body analysis by Rothera Nitroprusside test.		CO2
4	**SERUM AMYLASE**	4. Estimation of Serum Amylase.		CO2
5	**SERUM LIPASE**	5. Estimation of Serum Lipase.		CO3
6	**MALLOY–EVELYN METHOD**	6. Estimation of Serum Total Bilirubin byMalloy–Evelyn method.		CO3
7	**BCG METHOD**	7. Estimation of Serum Albumin by BCG method and calculation of Globulin & A/Gratio.		CO4
8	**URICASE/ PAP METHOD**	8. Estimation of Serum uric acid by Uricase/ PAP method.		CO4
9	**SEMI AUTOANALYZER**	9. Demonstration of Semi Autoanalyzer.		CO5
10	**FLAME PHOTOMETER**	10. Demonstration of Flame Photometer.		CO5

Reference Books:

1. Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations.
2. Praful B. Godkar,DarshanP.Godkar, Textbook of Medical Laboratory Technology.
3. DrRamnikSood, Medical Laboratory Technology: Methods and Interpretations.
4. Bishop, Fody and Schoeff,ClinicalChemistry,techniques,principlesandcorrelations.
5. Singh &Sahni, Introductory Practical Bio chemistry.

e-Learning Source:

1. https://youtu.be/t5DvF5OVr1Y
2. https://youtu.be/gggC9vctvBQ
3. https://youtu.be/ufvZ8bYtyO8
4. https://youtu.be/Q6R4o-oECxs

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	P O 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	1	-	2	-	2	2	1	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	-	1	1	1	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	-	1	1	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	-	1	2	1	-
CO5	1	3	1	2	-	-	-	1	2	1	-	2	-	1	1	1	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV207	MEDICAL BIOCHEMISTRY- II LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV208**	**Title of the Course**	**BASICS OF CARDIOVASCULAR TECHNOLOGY-LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**2**	**1**	**0**	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	1. Students can understand the Basic concepts of cardiovascular technology. 2. Students can learn about the medical conditions related to the cardiovascular system						

Course Outcomes	
CO1	To understand the Basic Function of Heart
CO2	To understand the Gross Anatomy and Physiology of the Heart.
CO3	To understand the Non-invasive ECG techniques
CO4	To understand the purpose of ECG machines and related equipment

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**History taking**	Including the patient's demographic Data, Family history and Medical History.	30	CO1-4
2	**General Physical Examination and assessment of vital signs**	Heart rate, Blood pressure, Pulse rate		
3	**Basic Systemic Examination**	Vital sign measurement Pulse palpation and auscultation Vein observation Chest inspection, and palpation		
4	**Demonstration of ECG**	Concepts of ECG		

Reference Books:

1. A Textbook of Electrocardiography - Goldberger.
2. Nanda's A Textbook of Echocardiography.
3. A Text of Cardiac Catheterization & Interventions. Dr. W. Grossman's D. Baim.
4. A Textbook of Cardiovascular Medicine. Dr. Bruanwald's.

e-Learning Source:

1. https://www.slideshare.net/DJASMINEPRIYA/histopathology-introduction
2. https://www.ijohsjournal.org/article.asp?issn=2231-6027;year=2018;volume=8;issue=2;spage=63;epage=67;aulast=Theresa
3. HTTPS://WWW.SLIDESHARE.NET/VARUGHESEGEORGE/HEMATOXYLIN-AND-EOSIN-STAINING-67250220

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	-	1
CO2	1	3	1	3	-	-	-	1	3	-	-	3	3	2	-	2	-	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	3	1	-	1	-	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	-	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	-	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV208	BASICS OF CARDIOVASCULAR TECHNOLOGY-LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	3,4

INTEGRAL UNIVERSITY, LUCKNOW

INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

BACHELOR OF SCIENCE IN CARDIOVASCULAR TECHNOLOGY (B.Sc. CVT)

SYLLABUS

YEAR/ SEMESTER: II/IV

Integral University, Lucknow

Department of Paramedical Sciences

Study and Evaluation Scheme

Program: B.Sc. CVT

Semester-IV

S. N.	Course code	Course Title	Type of Paper	Period Per			Evaluation Scheme				Sub. Total	Credit	Total Credits
				L	T	P	CT	TA	Total	ESE			
THEORIES													
1	CV210	Clinical Hematology-II	Core	2	1	0	40	20	60	40	100	2:1:0	3
2	CV211	Advanced Cardiovascular Technology	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	CV212	Clinical Biochemistry	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	CV213	Applied Microbiology	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	CV214	Principles of Laboratory Management	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	CV215	Clinical Hematology-II Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
2	CV216	Advanced Cardiovascular Technology Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
3	CV217	Clinical Biochemistry - Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
4	CV218	Hospital Posting	Core	0	0	14	40	20	60	40	100	0:0:1	7
Total				**10**	**05**	**20**	**360**	**180**	**540**	**360**	**900**	**25**	**25**

S. N.	Course code	Course Title	Type of Paper	Attributes							Nation Sustainable Development Goal (SDGs)
				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
THEORIES											
1	CV210	Clinical Hematology-II	Core	√	√	√	√		√	√	3,4
2	CV211	Advanced Cardiovascular Technology	Core	√	√	√	√		√	√	3,4
3	CV212	Clinical Biochemistry	Core	√	√	√	√		√	√	3,4
4	CV213	Applied Microbiology	Core	√	√	√	√		√	√	3,4
5	CV214	Principles of Laboratory Management	Core	√	√	√	√		√	√	3,4
PRACTICAL											
1	CV215	Clinical Hematology-II Lab	Core	√	√	√	√		√	√	3,4
2	CV216	Advanced Cardiovascular Technology Lab	Core	√	√	√	√		√	√	3,4
3	CV217	Clinical Biochemistry - Lab	Core	√	√	√	√		√	√	3,4
4	CV218	Hospital Posting	Core	√	√	√	√		√	√	3,4

L: Lecture **T:** Tutorials **P:** Practical **CT:** Class Test **TA:** Teacher Assessment **ESE:** End Semester Examination,

AE= Ability enhancement, DSE- Discipline Specific Elective, **Sessional Total:** Class Test + Teacher Assessment **Subject Total:** Sessional Total + End Semester Examination (ESE)

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV210**	**Title of the Course**	**CLINICAL HAEMATOLOGY - II**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	2	1	0	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	• The hematology curriculum aims to prepare students in basic understanding of Hematological disorders and their laboratory diagnosis and basics of blood banking. Students would also be introduced to laboratory instrumentation, techniques and methods of estimating different parameters of blood and their clinical significance. • The academic emphasis of this module is that students would learn basic, special and advanced hematological techniques and basics of blood banking.						

Course Outcomes	
CO1	Student will be able to gain knowledge about Anemia, its types, investigation techniques, bone marrow examination
CO2	Students will be able to gain knowledge about ABO grouping system, its determination, blood collection and donation techniques
CO3	Students will be able to gain knowledge about leukemia, its cytochemistry
CO4	Students will be able to gain knowledge about disorders of platelets, Hemophilia, Von-Willebrand disease and Lab diagnosis
CO5	Students will be able to gain knowledge about LE cell, its testing and demonstration of Blood parasites

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**ANEMIA AND DIAGNOSIS**	Anemia of chronic disorders, Sideroblastic anemia, Aplastic anemia, Thalassemia - classification, etiopathogenesis, clinical features and laboratory investigations, Hemoglobin electrophoresis. Bone marrow examination (Bone marrow needle, aspiration technique, processing and staining).	6	CO1
2	**ABO BLOOD GROUPING SYSTEM AND TECHNIQUES**	Genetics of ABO blood group system. Red cell reagents and preparation of red cell suspension. Method of determination of ABO and Rh blood group. Other blood group system. Importance of blood grouping. Donor selection. Blood collection, and additive systems.	6	CO2
3	**LEUKEMIA & CYTOCHEMISTRY TECHNIQUES**	Leukemia, Cytochemistry - Detail of cytochemical stains, its preparation, Role of cytochemistry in diagnosis of various types of leukemia	6	CO3
4	**PLATELET DISORDERSAND ITS DIAGNOSIS**	Disorders of platelets - Qualitative and quantitative. Disorders of primary and secondary hemostasis, approach to patient with bleeding and coagulation disorders. Hemophilia and Von-Willebrand disease and their lab diagnosis, Disseminated intravascular coagulation, Disorder of fibrinogen, quantitative factor assay.	6	CO4
5	**LE CELL TEST, BLOODPARASITE DEMONSTRATION TECHNIQUES**	LE cell, its demonstration, procedure of LE cell test and its clinical significance, Demonstration of Blood parasites - Malaria, Filariasis, Leishmania.	6	CO5

Reference Books:

1. Godkar B' Praful (2016): Textbook of Medical laboratory Technology (3rd edition) Bhalani Publications.
2. Singh Tejinder (2014): Atlas &Textbook of Hematology (3rd edition), Avichal Publications
3. SoodRamnik (2015): Medical Laboratory Technology: Methods and Interpretations (vol - 1 &2).
4. Lewis, Mitchell S: Dacie and Lewis PracticalHematology.
5. Kawthalkar, Shrish M: Essential of ClinicalPathology.

e-Learning Source:

1 https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt

2 https://www.ucsfhealth.org/medical-tests/semen-analysis#:~:text=Semen%20analysis%20is%20one%20of,have%20a%20male%20infertility%20problem.

3 https://www.youtube.com/watch?v=wZCKrseSIOE

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO2	1	3	2	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO3	1	3	1	2	-	-	-	1	1	1	-	3	2	1	1	1	1
CO4	2	3	1	2	-	-	-	1	1	1	-	3	2	2	1	1	1
CO5	1	3	1	2	-	-	-	1	1	1	-	3	2	1	1	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV210	CLINICAL HAEMATOLOGY - II	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV211**	**Title of the Course**	**ADVANCED CARDIOVASCULAR TECHNOLOGY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	2	1	0	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	1. The curriculum of advance Cardiovascular Technology aims to prepare the students to understand and learn about handling and processing of Cath Lab Instruments.						

Course Outcomes	
CO1	Student will be able to gain knowledge about Echo in rheumatic heart disease
CO2	Student will be able to gain knowledge about Echo in congenital heart disease
CO3	Students will be able to gain knowledge about Echo in ischemic heart disease
CO4	Student will be able to gain knowledge about Echo in other cardiovascular disease
CO5	Student will be able to gain knowledge about Echo in pericardial disease

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**ECHO IN HEART DISEASES**	**Echo in rheumatic heart disease –** Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, pulmonary hypertension. Post AVR, post MVR. Prosthetic valve malfunction, LA clot. **Echo in congenital heart disease –** Echo in ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF. Dextrocardia. **Echo in ischemic heart disease –** Echo in acute myocardial infarction, old myocardial infarction and other ischemic heart disease related conditions, LV aneurysm.	8	CO1
2	**ECHO IN OTHER CARDIOVASCULAR DISEASES**	**Echo in other cardiovascular disease** – Echo in various types of cardio myopathy, infective endocarditis diseases of aorta, mitral valve prolapse, myxoma and other cardiovascular diseases. **Assessment of Cardiac function** – measurements of all cardiac chambers and assessment of cardiac function. **Echo in pericardial disease** – pericardial effusion, cardiac tamponade, constructive pericarditis	7	CO2
3	**CARDIAC CATHETERIZATION**	**Cardiac catheterization laboratory** – general details of cardiac catheterization equipment, how to handle the machine, common problems one may come across and how to overcome it, radiation hazards. **Materials used in the Cath lab** – all catheters, balloons, guide wires, pacemakers contrast material and other material used in the cardiac catheterization laboratory and sterilization of all these materials. **Right heart catheterization** – procedure, cath position, oximetry at various levels, angios done and its interpretation. **Left heart catheterization** – procedure, cath position, oximetry at various levels, angios done and its interpretation.	7	CO3
4	**CORONARY ANGIOGRAM**	**Coronary angiogram •** Procedure, materials used, type and amount dye used, indications and contraindications, various pictures recorded in various angles and gross interpretation.	4	CO4
5	**PERIPHERAL ANGIOGRAM**	**Peripheral angiogram •** Procedure, indication and contraindication	4	CO5

Reference Books:

1. Goldberger, A Text book of Electrocardiography, Elsevier pub, 9th edition, 2017
2. K.C. Verma Sourabh verma, Clinical Echocardiography, CBS Publishers, 2010.
3. Arman T. Askari, Introductory Guide to Cardiac Catheterization, LWW pub, 1st edi, 2010

e-Learning Source:

1. https://www.slideshare.net/DJASMINEPRIYA/histopathology-introduction
2. https://www.ijohsjournal.org/article.asp?issn=2231-6027;year=2018;volume=8;issue=2;spage=63;epage=67;aulast=Theresa
3. https://www.slideshare.net/VarugheseGeorge/hematoxylin-and-eosin-staining-67250220

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1
CO2	1	3	1	3	-	-	-	1	3	-	-	3	3	2	-	1	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	3	1	-	1	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV211	Advanced Cardiovascular Technology	✓	✓	✓	✓		✓	✓	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV212**	**Title of the Course**	**CLINICAL BIOCHEMISTRY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	**2**	**1**	**0**	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This paper gives a brief understanding about various types of function test, acid base balance and associated disorders.						

Course Outcomes	
CO1	Students will be able to gain knowledge about Liver function tests
CO2	Students will be able to gain knowledge about Renal Function Test
CO3	Students will be able to gain knowledge about Cardiac Function test
CO4	Students will be able to gain knowledge about Gastric function Test
CO5	Students will be able to gain knowledge about Acid base balance, arterial blood gas analysis

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**LFT**	**Liver function tests:** Introduction, bile pigment metabolism, jaundice and its types, Estimation of Bilirubin, Bile salt, Bile pigments, urobilinogen, SGPT/ALT, SGOT/AST, ALP, GGT, Viral Hepatitis.	6	CO1
2	**RFT/KFT**	Renal Function Test: Introduction, Glomerular filtration rate, renal threshold, Urea, Creatinine, Uric Acid, Sodium, Potassium, Creatinine Clearance test, Urea clearance test, examination of renal calculi.	6	CO2
3	**CARDIAC FUNCTION TEST**	**Cardiac Function test:** Introduction, myocardial infarction, CHD, Biochemical markers of Heart diseases, Role of laboratory in monitoring heart diseases.	6	CO3
4	**GASTRIC FUNCTION TESTS**	**Gastric function Test:** Introduction, gastric secretions, total and free acid, stimulation test, physical & chemical examination of gastric secretions. Tumor markers: Introduction, types, applications.	6	CO4
5	**ACID-BASE BALANCE AND ANALYSIS**	Acid base balance, action of buffer system, Hb buffers, respiratory and metabolic acidosis, respiratory and metabolic alkalosis, arterial blood gas analysis, blood gas analyzer.	6	CO5

Reference Books:

1.DMVasudevan,(2011),TextbookofMedicalBiochemistry,6th editionJaypeePublishers.

2. MNChatterjea&RanaShinde,(2012),TextbookofMedicalBiochemistry,8th ed ition, Jayppe Publication

3.Singh &Sahni,(2008),Introductory Practical Biochemistry,2nd edition,Alphascience.

4. Lehninger,(2013),Principles of Biochemistry,6th edition, WH Freeman.

5. U Satyanarayan,(2008), Essentials of Biochemistry,2nd edition, Standard Publishers.

6. Teitz,(2007),Fundamentals of Clinical Chemistry,6th edition,ElsevierPublications.

e-Learning Source:

1.https://youtu.be/t5DvF5OVr1Y

2.https://youtu.be/gggC9vctvBQ

3.https://youtu.be/ufvZ8bYtyO8

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
CV212	CLINICAL BIOCHEMISTRY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		√	√	√	√		√	√	**3,4**

INTEGRAL UNIVERSITY, LUCKNOW

Effective from Session: 2024-2025							
Course Code	**CV213**	**Title of the Course**	**APPLIED MICROBIOLOGY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	**3**	**1**	**0**	**4**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	The course is designed to help the students to develop an understanding of Sterilization and disinfection. It also provides opportunity for infection control measures for various urinary and blood born infections with emphasis on clinical application to practice.						

Course Outcomes: After the successful course completion, learners will develop the following attributes:	
CO1	Students will be able to understand the basics of Sterilization and disinfection.
CO2	Students will be able to understand the importance of Sterilization and disinfection.
CO3	Students will be able to understand the health care-associated infections.
CO4	Students will be able to understand Urinary tract infections.
CO5	Students will be able to understand Blood borne viral infections.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**CSSD**	1. Sterilization and disinfection - classification, principles, methods 2. Central sterile supply department (CSSD) functioning and importance	8	CO1
2	**IMPORTANCE OF STERILIZATION AND DISINFECTION**	1. Disinfection of instruments used in patient care 2. Disinfection of patient care unit 3. Infection control measures for ICUs	8	CO2
3	**HEALTH CARE-ASSOCIATED INFECTIONS**	1. Surgical site infections 2. Ventilator associated pneumonia 3. Catheter associated blood stream infections 4. Antibiotic associated diarrhea	8	CO3
4	**URINARY TRACT INFECTIONS**	1. Anatomy of Urinary System 2. Types of infections 3. Etiology 4. Pathogenesis 5. Laboratory diagnosis - Specimen collection, processing, interpretation	8	CO4
5	**BLOOD BORNE VIRAL INFECTIONS**	1. Morphology, pathogenesis, clinical features, laboratory diagnosis and prophylaxis of following viral infections Hepatitis B, D and C virus 2. Human immunodeficiency virus	8	CO5

Reference Books:

1. Ananthanarayanan (R), Textbook of Microbiology, Orient Longman,10th Edi, 2017.
2. Mackie and McCartney Practical Medical Microbiology, Relx India Pvt, 14th Edi, 2018.
3. Baveja CP, Textbook of Microbiology, APC, 6th edi, 2021.
4. Sriram Kumar (S),Textbook of Microbiology, All win Publication, 1st Edi, 2019

e-Learning Source:

1. https://youtu.be/a0lWFQvQKw8
2. https://youtu.be/qhiMmNZjHRg
3. https://youtu.be/-znHCAu5OnY
4. https://youtu.be/t2tKyjj7u5Y

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	-	-	-	-	-	-	-	-	1	3	-	1	-	2
CO2	3	3	-	-	-	2	-	-	-	-	-	-	3	3	2	3	3
CO3	2	3	-	-	-	2	-	-	-	-	-	1	3	2	1	3	2
CO4	3	3	-	-	-	-	-	-	-	-	-	-	2	3	2	2	3
CO5	3	3	-	-	-	3	-	1	-	-	-	-	3	3	2	3	3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV213	**APPLIED MICROBIOLOGY**	√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**CV214**	**Title of the Course**	**BASICS OF PATIENT CARE**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	**2**	**1**	**0**	**3**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This course has been formulated to impart basic aspects of patient care in the intensive care and dialysis unit.						

Course Outcomes: After the successful course completion, learners will develop the following attributes:	
CO1	The students will understand **the fundamentals of patient care.**
CO2	The students will understand **reporting & recording of patients**
CO3	The students will understand **the introduction to emergency services.**
CO4	The students will understand **the principle of mechanical ventilation and injection.**
CO5	The students will understand **the basics of emergency care and life support skills.**

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**FUNDAMENTALS OF PATIENT CARE**	1. Fundamentals of Patient Care Concept of health & Illness. 2. Health Determinants 3. Concept of Patients & Their Types, Patient Centered Care & 4. Fundamentals of Communications.	6	CO1
2	**REPORTING & RECORDING OF PATIENTS**	1. Reporting & Recording of Patients 2. Rights of Patients 3. Concepts of Disease & Its Types 4. General Concept, Care & Prevention of Accident, Trauma & Infections	6	CO2
3	**INTRODUCTION TO EMERGENCY SERVICES**	1. Introduction to Emergency Services 2. Organization of Emergency Department, Guidelines in Emergency 3. Clinical Monitoring 4. Fluid Therapy and Blood Transfusion	6	CO3
4	**PRINCIPLE OF MECHANICAL VENTILATION AND INJECTION**	1. Principal of Mechanical Ventilation 2. Ventilations including use of bag-valve-masks (BVMs) 3. Injection – An Infusion Method 4. Acid Base and Electrolyte Imbalance	6	CO4
5	**BASICS OF EMERGENCY CARE AND LIFE SUPPORT SKILLS**	1. Vital signs and primary assessment 2. Basic emergency care – first aid and triage 3. Airway Management, Cardiopulmonary Resuscitation 4. Choking, rescue breathing methods 5. One- and Two-rescuer CPR f. Using an AED (Automated external defibrillator) 6. Managing an emergency including moving a patient	6	CO5

Reference Books:

1. Charles Vincent. The Essentials of Patient Safety. 25 June 2010
2. *I Clement*. Textbook of Nursing Foundation ed. 2. 2017
3. Prof. Dr M Rajadurai. Principles of Mechanical Ventilation - For Emergency Physicians. Edition: 1, 2022.
4. Clement I. Basic Concepts of Nursing Procedures Ed. 2 2013.
5. Fluid Management & Blood Component Therapy. In: Butterworth IV JF, Mackey DC, Wasnick JD. eds. *Morgan & Mikhail's Clinical Anesthesiology, 6e*. McGraw-Hill Education; 2018. Accessed October 30, 2024.

e-Learning Source:

1. https://mohfw.gov.in/sites/default/files/Provider%20Course%20Manual%20for%20Paramedics.pdf
2. Almesned A, Almeman A, Alakhtar AM, AlAboudi AA, Alotaibi AZ, Al-Ghasham YA, Aldamegh MS. Basic life support knowledge of healthcare students and professionals in the Qassim University. Int J Health Sci (Qassim). 2014 Apr;8(2):141-50. doi: 10.12816/0006080.

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	2	-	-	-	1	2	1	-	2	2	1	-	1	-
CO2	1	3	1	3	-	-	-	2	3	-	-	3	3	2	-	2	-
CO3	1	3	1	2	-	-	-	1	2	2	-	2	3	1	-	1	-
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	-
CO5	1	3	1	2	-	-	-	1	2	1	-	2	2	1	-	1	-

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
CV214	**BASICS OF PATIENT CARE**	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**

INTEGRAL UNIVERSITY, LUCKNOW

Effective from Session: 2024-25							
Course Code	**CV217**	**Title of the Course**	**CLINICAL BIOCHEMISTRY- LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	0	0	2	**1**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This paper gives a brief understanding about various types of function test, acid base balance and associated disorders.						

Course Outcomes: After the successful course completion, learners will develop following attributes:	
CO1	Student will be able to gain knowledge about Bilirubin, SGOT conc, SGPT conc
CO2	Student will be able to gain knowledge about ALP Conc, total and free acidity
CO3	Student will be able to gain knowledge about CPK test, CK-MB test
CO4	Student will be able to gain knowledge about serum sodium Conc, serum potassium conc
CO5	Student will be able to gain knowledge about uric acid conc, phosphorus conc

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**LFT, RFT/KFT, CARDIAC FUNCTION TEST, GASTRIC FUNCTIONTESTS, ACID-BASE BALANCE AND ANALYSIS**	1. To determine total, direct and indirect bilirubin	30	CO1
2		2. To determine SGOT conc		CO1
3		3. To determine SGPT conc		CO1
4		4. To determine ALP Conc		CO2
5		5. To determine total and free acidity.		CO2
6		6. To perform CPK test.		CO3
7		7. To perform CK-MB test.		CO3
8		8. To determine serum sodium conc.		CO4
9		9. To determine serum potassium conc.		CO4
10		10. To determine uric acid conc.		CO5
11		11. To determine phosphorus conc.		CO5

Reference Books:C

1. DMVasudevan,(2011),TextbookofMedicalBiochemistry,6th edition, Jaypee Publishers.
2. MNChatterjee&RanaShinde,(2012),TextbookofMedicalBiochemistry,8th edition,JayppePublications.
3. Singh &Sahni,(2008),Introductory Practical Biochemistry,2nd edition,Alphascience.
4. Lehninger,(2013),Principles of Biochemistry,6th edition, WH Freeman.
5. U SatyaNarayan,(2008), Essentials of Biochemistry,2nd edition, Standard Publishers.
6. Treitz,(2007),Fundamentals of Clinical Chemistry,6th edition,ElsevierPublications

e-Learning Source:

1.https://youtu.be/t5DvF5OVr1Y
2.https://youtu.be/gggC9vctvBQ
3.https://youtu.be/ufvZ8bYtyO8

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV217	CLINICAL BIOCHEMISTRY- LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**

INTEGRAL UNIVERSITY, LUCKNOW

Effective from Session: 2024-25							
Course Code	**CV216**	**Title of the Course**	**ADVANCED CARDIOVASCULAR TECHNOLOGY LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	0	0	2	**1**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	The curriculum of advance Cardiovascular Technology aims to prepare the students to understand and learn about handling and processing of Cath Lab Instruments.						

Course Outcomes	
CO1	Student will be able to gain knowledge about Echo in rheumatic heart disease
CO2	Student will be able to gain knowledge about Echo in congenital heart disease
CO3	Students will be able to gain knowledge about Echo in ischemic heart disease
CO4	Student will be able to gain knowledge about Echo in other cardiovascular disease
CO5	Student will be able to gain knowledge about Echo in pericardial disease

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**ECHO IN RHEUMATIC HEART DISEASE**	Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, pulmonary hypertension. Post AVR, post MVR. Prosthetic valve malfunction, LA clot.	30	CO1
2	**ECHO IN CONGENITAL HEART DISEASE**	Echo in ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF. Dextrocardia.		CO2
3	**ECHO IN ISCHEMIC HEART DISEASE**	Echo in acute myocardial infarction, old myocardial infarction and other ischemic heart disease related conditions, LV aneurysm		CO3
4	**ASSESSMENT OF CARDIAC FUNCTION**	Measurements of all cardiac chambers and assessment of cardiac function		CO4
5	**ECHO IN PERICARDIAL DISEASE**	Pericardial effusion, cardiac tamponade, constructive pericarditis		CO5

Reference Books:

Goldberger, A Text book of Electrocardiography, Elsevier pub, 9th edition, 2017

K.C. Verma Sourabh verma, Clinical Echocardiography, CBS Publishers, 2010.

Arman T. Askari, Introductory Guide to Cardiac Catheterization, LWW pub, 1st edi, 2010

e-Learning Source:

1. https://www.slideshare.net/DJASMINEPRIYA/histopathology-introduction
2. https://www.ijohsjournal.org/article.asp?issn=2231-6027;year=2018;volume=8;issue=2;spage=63;epage=67;aulast=Theresa
3. https://en.wikipedia.org/wiki/Periodic_acid%E2%80%93Schiff_stain

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1
CO2	1	3	1	3	-	-	-	1	3	-	-	3	3	2	-	1	1
CO3	1	3	1	2	-	-	-	1	2	-	-	2	3	1	-	1	1
CO4	1	3	1	2	-	-	-	1	3	-	-	3	2	1	-	1	1
CO5	1	3	1	2	-	-	-	1	2	-	-	2	2	1	-	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	Course Title	Attributes							SDGs No.
CV216	ADVANCED CARDIOVASCULAR TECHNOLOGY LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**

Integral University, Lucknow

INTEGRAL UNIVERSITY, LUCKNOW

Effective from Session: 2024-25							
Course Code	**CV218**	**Title of the Course**	**CLINICAL POSTING**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	0	0	14	**7**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives							

Course Outcomes: After the successful course completion, learners will develop following attributes:	
CO1	Student will be able to learn and experience the practical handling of patients.
CO2	Student will be able to learn and experience collection and processing of blood, urine, sputum stool and body fluids samples
CO3	Student will be able to learn and experience identification of patient's particulars based on CR number, Lab Number
CO4	Student will be able to learn and experience transfer of samples from collection centers to different labs
CO5	Student will be able to learn and experience. process of performing various tests in different labs.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**HOSPITAL POSTING**	Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples. Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection centers to different labs. Process of performingvarious tests in different labs. Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 100.	180	CO1-5
e-Learning Source:				
1.https://www.onepointesolutions.com/blog/how-to-design-a-pathology-lab/				
2.http://www.naco.gov.in/sites/default/files/1Guideline%20doc%20design%20of%20BSL2%20labs(dist,hosp,chc&phc)%20level.pdf				
3.file:///Users/rohitsrivastava/Downloads/9789241516938-eng.pdf				

	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	2	1	-	-	-	1	1	-	1	2	1	3	2	1
CO2	1	3	-	2	-	-	-	-	1	-	-	1	2	1	3	2	1
CO3	2	3	-	2	-	-	-	-	1	1	-	1	2	1	3	2	1
CO4	1	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1
CO5	2	3	-	1	-	-	-	-	1	-	-	1	2	1	3	2	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
CV218	**HOSPITAL POSTING**	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		✓	✓	✓	✓		✓	✓	**3,4**