# INTEGRAL UNIVERSITY, LUCKNOW

**INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH**

## DEPARTMENT OF BASIC MEDICAL 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 | Microbiology Lab | Core | 0 | 0 | 4 | 40 | 20 | 60 | 40 | 100 | 0:0:2 | 2 |
| 3 | CV208 | Medical Biochemistry -II Lab | Core | 0 | 0 | 4 | 40 | 20 | 60 | 40 | 100 | 0:0:2 | 2 |
| 4 | CV209 | Basics of Cardiovascular Technology Lab | Core | 0 | 0 | 4 | 40 | 20 | 60 | 40 | 100 | 0:0:2 | 2 |
| **Total** | | | | **12** | **06** | **16** | **400** | **200** | **600** | **400** | **1000** | **26** | **26** |

| 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 | Microbiology Lab | Core | √ | √ | √ | √ | | √ | √ | 3,4 |
| 3 | CV208 | Medical Biochemistry -II Lab | Core | √ | √ | √ | √ | | √ | √ | 3,4 |
| 4 | CV209 | 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<br>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.** |
|---|---|---|---|---|---|---|---|---|---|
| CV201 | CLINICAL HAEMATOLOGY- I | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | |
| | | √ | √ | √ | | | √ | √ | **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.<br>• 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.<br>• Dark ground illumination, care of microscope and common difficulties micrometry.<br>• Bright Field Microscope, Dark Field Microscope, Phase Contrast Microscope, Fluorescence Microscope, Transmission Electron Microscope, Scanning Electron Microscope, Confocal 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.<br>• Structure, function and chemical composition of bacterial cell membranes.<br>• 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.<br>• Sterilization and disinfection: Various physical methods of sterilization heat.<br>• UV radiation, ionizing radiation, filtration, characters affecting sterilization, auto clave control and sterilization indicators.<br>• 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.<br>• 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, Harley and 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: 2024-2025 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **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 PHARMACOLOGY** | 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 | **CHEMOTHERAPY AND MISCELLANEOUS** | 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 19t$^{n}$ 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. |
|---|---|---|---|---|---|---|---|---|---|
| | | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | |
| **CV203** | **PHARMACOLOGY** | √ | √ | √ | | | √ | √ | **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.<br>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. |
|---|---|---|---|---|---|---|---|---|---|
| CV204 | MEDICAL BIOCHEMISTRY-II | Employability | Entrepreneurship | Skill Developme | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | |
| | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | **3,4** |

# INTEGRAL UNIVERSITY

| 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.<br>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.<br>2. Systemic and pulmonary circulation,<br>3. Coronary structure.<br>4. Chest topography.<br>5. Surface marking of heart.<br>6. Conduction system of the heart | **6** | **CO1** |
| **2** | **NONINVASIVE ECG** | 1. Technique of ECG recording<br>2. ECG leads system<br>3. ECG waves, intervals and segments - person, Osborn wave, delta wave, epsilon wave<br>4. ECG reporting exercise testing | **6** | **CO2** |
| **3** | **NONINVASIVE ECHOCARDIOGRAPHY** | 1. Introduction and purposes, demonstration of machine parts,<br>2. Basic windows<br>3. Echocardiographic views<br>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.<br>2. Radiation safety and protocols.<br>3. Catheterization of heart and angiography<br>4. Maintaining sterility and patient care | **6** | **CO4** |
| **5** | **GAS ADMINISTRATION DEVICES** | 1. Gas administration devices (reducing valves, flow meters and regulators).<br>2. A) simple oxygen administration devices.<br>3. Methods of controlling gas flow.<br>4. Reducing valves, flow meters, restrictors and regulators<br>5. 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://r.search.yahoo.com/_ylt=AwrOp8qqeHNnCJU2o5BXNyoA;_ylu=Y29sbwNncTEEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1736830378/RO=10/RU=https%3a%2f%2fwww.ncbi.nlm.nih.gov%2fbooks%2fNBK493197%2f/RK=2/RS=ynsEISHC6tJvU9ljCR9eLg79KbE-
2. https://r.search.yahoo.com/_ylt=AwrOp8qqeHNnCJU2pJBXNyoA;_ylu=Y29sbwNncTEEcG9zAzIEdnRpZAMEc2VjA3Ny/RV=2/RE=1736830378/RO=10/RU=https%3a%2f%2fwww.ncbi.nlm.nih.gov%2fbooks%2fNBK2204%2f/RK=2/RS=HuyvbdJZYZJKKUqry5Kd4Yqjmpo-

**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. |
|---|---|---|---|---|---|---|---|---|---|
| CV205 | Basics of Cardiovascular technology | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | |
| | | √ | √ | √ | | | √ | √ | **3,4** |

# Integral University, Lucknow

| Effective from Session: 2018-19 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **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.<br>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. |
|---|---|---|---|---|---|---|---|---|---|
| ES101 | ENVIRONMENTAL STUDIES | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | |
| | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | **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** | **1)** Thehematologycurriculumaimstopreparestudentsinbasicunderstandingofcomposition of blood. Students would also be introduced to laboratory waste management protocols, instrumentation, techniques and methods of estimating different parameters of blood.<br>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=wZCKrseSlOE**

| | **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** | **MICROBIOLOGY- I LAB** | **L** | **T** | **P** | **C** |
| **Year** | **II** | **Semester** | **III** | **0** | **0** | **4** | **2** |
| **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** | Student will be able to gain knowledge about Microscopy, glassware, Sterilization and Disinfection |
| **CO2** | Student will be able to learn about staining methods used in Bacteriology |
| **CO3** | Student will be able to learn about capsule and Spore detection testing |
| **CO4** | Student will be able to gain knowledge about antigen -antibody reaction |
| **CO5** | Student will be able to learn about serology testing techniques |

| Unit No. | Title of the Unit | Content of Unit | Contact Hrs. | Mapped CO |
|---|---|---|---|---|
| 1 | **MICROSCOPY** | 1. Demonstration of Microscope and its parts. | 60 | CO1 |
| 2 | **GLASSWARES** | **2.** Demonstration of glassware used in microbiology. | | CO1 |
| 3 | **AUTOCLAVES** | 3. Demonstration of autoclave and sterilization of glasswares. | | CO1 |
| 4 | **HOT AIR OVEN** | 4. Demonstration of Hot air oven and sterilization of glasswares. | | CO2 |
| 5 | **GRAM STAINING** | 5. To perform Gram staining. | | CO2 |
| 6 | **STAINING METHODS** | 6. To perform Acid fast staining (Zeihl- Neelsen staining). | | CO2 |
| 7 | **STAINING METHODS** | 7. To perform Indian ink staining. | | CO3 |
| 8 | **MOTILITY TESTING** | 8. To perform Hanging drop method. | | CO3 |
| 9 | **CAPSULE DETECTION** | 9. Demonstration of capsule. | | CO3 |
| 10 | **SPORE STAINING** | 10. Staining of bacterial spores. | | CO4 |
| 11 | **ANTIGEN ANTIBODY REACTION** | 11. To demonstrate agglutination reaction. | | CO4 |
| 12 | **SEROLOGY TEST** | 12. To perform RA test. | | CO4 |
| 13 | **SEROLOGY TEST** | 13. To perform WIDAL test. | | CO5 |
| 14 | **SEROLOGY TEST** | 14. To perform RPR test. | | CO5 |
| 15 | **SEROLOGY TEST** | 15. To perform CRP test. | | CO5 |

**Reference Books:**


1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.
2. Brooks G.F., Carroll K.C., ButelJ. S., MorseS . A. and Mietzner, T.A.(2013).


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

| Course Code | Course Title | Attributes | | | | | | | SDGs No. |
|---|---|---|---|---|---|---|---|---|---|
| CV207 | FUNDAMENTALS OF MICROBIOLOGY- 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** | **CV208** | **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** | | | | | | | |

| **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 by Malloy–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,FodyandSchoeff,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. |
|---|---|---|---|---|---|---|---|---|---|
| CV208 | 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** | **CV209** | **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.<br>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.** |
|---|---|---|---|---|---|---|---|---|---|
| CV209 | 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 | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | Sustainable Development Goal (SDGs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **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.<br>• 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,<br>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** |
| | | | | | | | | | |

**Effective from Session: 2024-25**

# Integral University, Lucknow

| 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 histopathology and its techniques aims to prepare the students to understand and learn about handling and processing of biopsies and procedure of special staining techniques.<br>2. Students would learn the basic histopathological (routine and special). | | | | | | |

| 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.<br>**Echo in congenital heart disease –** Echo in ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF. Dextrocardia.<br>**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.<br>**Assessment of Cardiac function** – measurements of all cardiac chambers and assessment of cardiac function.<br>**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.<br>**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.<br>**Right heart catheterization** – procedure, cath position, oximetry at various levels, angios done and its interpretation.<br>**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<br>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<br>2. Disinfection of patient care unit<br>3. Infection control measures for ICUs | 8 | CO2 |
| 3 | **HEALTH CARE-ASSOCIATED INFECTIONS** | 1. Surgical site infections<br>2. Ventilator associated pneumonia<br>3. Catheter associated blood stream infections<br>4. Antibiotic associated diarrhea | 8 | CO3 |
| 4 | **URINARY TRACT INFECTIONS** | 1. Anatomy of Urinary System<br>2. Types of infections<br>3. Etiology<br>4. Pathogenesis<br>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<br>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.<br>2. Health Determinants<br>3. Concept of Patients & Their Types, Patient Centered Care &<br>4. Fundamentals of Communications. | 6 | CO1 |
| 2 | **REPORTING & RECORDING OF PATIENTS** | 1. Reporting & Recording of Patients<br>2. Rights of Patients<br>3. Concepts of Disease & Its Types<br>4. General Concept, Care & Prevention of Accident, Trauma & Infections | 6 | CO2 |
| 3 | **INTRODUCTION TO EMERGENCY SERVICES** | 1. Introduction to Emergency Services<br>2. Organization of Emergency Department, Guidelines in Emergency<br>3. Clinical Monitoring<br>4. Fluid Therapy and Blood Transfusion | 6 | CO3 |
| 4 | **PRINCIPLE OF MECHANICAL VENTILATION AND INJECTION** | 1. Principal of Mechanical Ventilation<br>2. Ventilations including use of bag-valve-masks (BVMs)<br>3. Injection – An Infusion Method<br>4. Acid Base and Electrolyte Imbalance | 6 | CO4 |
| 5 | **BASICS OF EMERGENCY CARE AND LIFE SUPPORT SKILLS** | 1. Vital signs and primary assessment<br>2. Basic emergency care – first aid and triage<br>3. Airway Management, Cardiopulmonary Resuscitation<br>4. Choking, rescue breathing methods<br>5. One- and Two-rescuer CPR f. Using an AED (Automated external defibrillator)<br>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** | **CV215** | **Title of the Course** | **CLINICAL HAEMATOLOGY- II LAB** | **L** | **T** | **P** | **C** |
| **Year** | **II** | **Semester** | **IV** | 0 | 0 | 2 | 1 |
| **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.<br>• 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 Platelet count, GBP |
| **CO2** | Student will be able to gain knowledge about Routine Romanowsky staining, Leukemia |
| **CO3** | Student will be able to gain knowledge about LAP scoring, Total platelet count, Thrombin time |
| **CO4** | Student will be able to gain knowledge about D-dimer test, Fibrinogen assay |
| **CO5** | Student will be able to gain knowledge about Hemoparasite, Electrophoresis |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | **PLATELET COUNT** | 1. Platelet count - manual and automated. | 30 | CO1 |
| 2 | **GBP** | 2. General blood Picture and its clinical significance. | | CO1 |
| 3 | **ROUTINE ROMANOWSKY STAINING** | 3. Staining of bone marrow (routine romanowsky staining and pearl Prussian blue staining). | | CO2 |
| 4 | **LEUKEMIA** | 4. Demonstration of leukemic slides. | | CO2 |
| 5 | **LAP SCORING** | 5. LAP scoring - procedure and clinical significance. | | CO3 |
| 6 | **TOTAL PLATELET COUNT** | 6. To determine total platelet count. | | CO3 |
| 7 | **THROMBIN TIME** | 7. Procedure of thrombin time. | | CO4 |
| 8 | **D-DIMER TEST** | 8. Procedure of D-dimer test and its clinical significance. | | CO4 |
| 9 | **FIBRINOGEN ASSAY** | 9. Fibrinogen assay. | | CO5 |
| 10 | **HEMOPARASITE** | 10.Demonstration of hemoparasite - malaria and filaria. | | CO5 |
| 11 | **ELECTROPHORESIS** | 11.Hemoglobin electrophoresis. | | CO5 |

**Reference Books:**


Godkar B' Praful (2016): Textbook of Medical laboratory Technology (3rd edition) Bhalani Publications.

Singh Tejinder(2014): Atlas &Textbook of Hematology (3rd edition), Avichal Publications

SoodRamnik (2015): Medical Laboratory Technology: Methods and Interpretations (vol - 1 &2).

Lewis, Mitchell S: Dacie and Lewis Practical Hematology.

Kawthalkar, Shrish M: Essential of Clinical Pathology.


**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**

| **PO-PSO CO** | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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.** |
|---|---|---|---|---|---|---|---|---|---|
| | | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | |
| **LS215** | CLINICAL HAEMATOLOGY- II LAB | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | **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 student will be taught about different type of Clinical aspects of Cardiovascular Technology in Cath Lab according to respective SOPS. | | | | | | |

| **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**

| **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 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** | 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** | **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** | The student will be taught about different type of Clinical aspects of Cardiovascular Technology according to respective SOPS. | | | | | | |

| **Course Outcomes:** After the successful course completion, learners will develop following attributes: | |
|---|---|
| **CO1** | To learn punctuality and interaction with colleagues and support staff during clinical training. |
| **CO2** | To develop assessment skills. |
| **CO3** | To develop appropriate treatment protocol. |
| **CO4** | To understand the importance of documentation of the case record and case presentation. |
| **CO5** | To develop discipline and improve overall quality of clinical work. |

| **Name of Student:** | | **Session:** | |
|---|---|---|---|
| **Enrolment Number:** | | **Date:** | |
| **Name of Course:** | **CLINICAL POSTING** | **Course Code:** | CV218 |
| **Topics:** | | | |

| **S. No.** | **Point to be Considered** | **Max. Marks** | **Marks Obtained** |
|---|---|---|---|
| **1.** | Punctuality | 4 | |
| **2.** | Interaction with colleagues and supporting staff | 2 | |
| **3.** | Maintenance of case records | 3 | |
| **4.** | Presentation of case during rounds | 2 | |
| **5.** | Maintained DT records | 2 | |
| **6.** | DT Manners | 2 | |
| **7.** | Report with patients | 2 | |
| **8.** | Assistance during operatives' procedures | 3 | |
| **9.** | Discipline | 2 | |
| **10.** | Overall quality of clinical work | 3 | |
| | TOTAL SCORE | **25** | |

## CLINICAL POTING ASSESSMENT FORM

(Name and signature of In-charge) (Head, Paramedical)

**GUIDELINES FOR CLINICAL TRAINING PROGRAM**

The students of the Post Graduate BCVT program must spend the above-mentioned allotted time period in the hospital based clinical training for specified clinical experiences to meet the objectives of the training program. This period of practical and theoretical experience will enable the students to acquire competency and experience to perform as independent practice and will enable to adjust to the real practical life in different units in the hospital settings.

| **S.No.** | **Program Name** | **Year/Semester** | **Duration of Training** |
|---|---|---|---|
| **1.** | B.Sc. Cardiovascular Technology | IInd Year/ IIIrd Semester | 4 Months |
| **2.** | | IInd Year/ IVth Semester | 4 Months |
| **3.** | | IIIrd Year/ Vth Semester | 4 Months |
| **4.** | | IIIrd Year/ VIth Semester | 4 Months |

By the successful completion of this clinical training period, the student is expected to fulfill the objectives of the program and will be examination as given below:

| **S.No.** | **Program Name** | **Year/Semester** | **Case file** | **Practical on Case** | **Voice/Viva** | **Attendance** |
|---|---|---|---|---|---|---|
| **1.** | B.Sc. Cardiovascular Technology | IIrd Year/ IIIrd Semester | 10 Marks | 10 Marks (1 Long Case and 2 Short Case) | 25 Marks | 5 Marks |
| **2.** | | IIrd Year/ IV th Semester | | | | |
| **3.** | | IIIrd Year/ Vth Semester | | | | |
| **4.** | | IIIrd Year/ VIth Semester | | | | |

EVALUATION OF CLINICAL POSTING

BCVT- Students must prepare 1 long case and 2 short cases during their clinical posting. The evaluation for internal clinical examination of 50 marks will be distributed:

clinical posting=**25 marks**. Viva voce =**20 marks** Attendance=**5 marks**

| | **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 | 3 | 2 | 3 | 2 | 3 | 1 | 2 | 1 | - | - | 3 | 2 | 3 | 3 | 2 |
| **CO2** | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 3 | - | - | 2 | 2 | 3 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 3 | - | - | 3 | 2 | 2 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 3 | - | - | 2 | 3 | 2 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 3 | - | - | 3 | 2 | 3 | 3 | 2 |

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

| **Course Code** | **Course Title** | **Attributes** | | | | | | | **SDGs No.** |
|---|---|---|---|---|---|---|---|---|---|
| **CV218** | **Clinical Posting** | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics | **3,4,11** |
| | | √ | √ | √ | | | √ | √ | |