



INTEGRAL UNIVERSITY, LUCKNOW
INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

**BACHELOR OF SCIENCE IN DIALYSIS
TECHNOLGY
(B. Sc. DT)**

SYLLABUS

YEAR/ SEMESTER: II/III



Integral University, Lucknow
Department of Basic Medical Sciences
Study and Evaluation Scheme

Program: B.Sc. Dialysis 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	DT201	Pathology	Core	2	1	0	40	20	60	40	100	2:1:0	3
2	DT202	Microbiology	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	DT203	Medical Biochemistry -II	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	DT204	Pharmacology	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	DT205	Immunology & Serology	Core	2	1	0	40	20	60	40	100	2:1:0	3
6	DT206	Renal Dialysis Technology-I	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	DT207	Immunology, Serology & Microbiology Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	DT208	Pathology Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
3	DT209	Medical Biochemistry -II 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	DT201	Pathology	Core	√	√	√	√		√	√	3,4
2	DT202	Microbiology	Core	√	√	√	√		√	√	3,4
3	DT203	Medical Biochemistry -II	Core	√	√	√	√		√	√	3,4
4	DT204	Pharmacology	Core	√	√	√	√		√	√	3,4
5	DT205	Immunology & Serology	Core	√	√	√	√		√	√	3,4
6	DT206	Renal Dialysis Technology-I	Core			√		√			3,4
PRACTICAL											
1	DT207	Immunology, Serology & Microbiology Lab	Core	√	√	√	√		√	√	3,4
2	DT208	Pathology Lab	Core	√	√	√	√		√	√	3,4
3	DT209	Medical Biochemistry -II 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



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	DT201	Title of the Course	PATHOLOGY	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	<p>(1) The curriculum of practical histopathology and its techniques aims to prepare the students to understand to learn about handling and tissue processing and prepare to aid in proper diagnosis..</p> <p>(2) The unique preposition of this paper is that the students should learn the basic histopathological techniques including laboratory organization, histopathology techniques.</p>						

Course Outcomes	
CO1	Students will be able to gain knowledge on safety measures in histopathology lab, Fixation techniques
CO2	Students will be able to gain knowledge on Grossing of tissues, processing and decalcification techniques
CO3	Students will be able to gain knowledge on Microtome, its working and types.
CO4	Students will be able to gain knowledge on Staining techniques

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCTION TO HISTOPATHOLOGY	1. Introduction of histopathology, laboratory organization, care & maintenance of equipment used in histotechnology lab. 2. Safety measures in histotechnology lab reception, recording, labeling and transportation of tissue specimens. 3. Basic concepts of fixation and various types of fixative used in histopathology and cytopathology.	7	CO1
2	GROSSING OF TISSUE	1. Grossing of tissues, whole mount, sections, tissue processing and its steps, manual and automated method, components & principle of automatic tissue processor. 2. Decalcification, decalcification methods, types of decalcifying fluid, Processing of bones and teeth, Embedding media, its type and properties.	8	CO2
3	MICROTOME	Microtome, its type and working, various type of microtome, Microtome knives, its type and knife sharpening, Section cutting, fault and remedies, Section adhesive.	7	CO3
4	STAIN	Progressive, regressive, vital, supravital staining, types of hematoxylin, hematoxylin and eosin staining, use of control sections in tissue staining, mounting and mounting media, Advantages & disadvantages, refractive index.	8	CO4

Reference Books:

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications.
3. Godkar. B. Praful, (2016) Textbook of MLT, 3rd edition, Bhalani Publications.
4. CFA Culling, (1974), Handbook of Histopathological and Histochemical techniques: Including Museum Techniques, 3rd edition, Butter worth publishers.

e-Learning Source:

1. <https://www.slideshare.net/DJASMINEPRIYA/histopathology-introduction>
2. <https://www.ijohjournal.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.
DT201	PATHOLOGY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
		/	/	/	/	/	/	/
3,4								



Integral University, Lucknow

Effective from Session: 2024-2025									
Course Code	DT204	Title of the Course	PHARMACOLOGY			L	T	P	C
Year	II	Semester	III			3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil						
Course Objective	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.	Mappe d 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 – propranolol, 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 MISCELLANEO US	Introduction – Beta lactum antibiotics: Penicillin’s – natural, semi synthetic penicillin’s – amoxicillin – cloxacillin-clauvulinic acid – sulbactam – Cephalosporin’s – cephalixin – cefuroxime – cefixime – ceftriaxone- 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 artemisinin, 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/t2tKvj7u5Y>

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

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	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	
DT204	PHARMACOLOGY	√	√	√			√	√	3,4



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	DT205	Title of the Course	IMMUNOLOGY & SEROLOGY	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	This course has been formulated to impart basic aspects of immunity, antigens, antibodies, various serological reactions, techniques and their utility in laboratory diagnosis of human diseases.						

Course Outcomes: After the successful course completion, learners will develop following attributes:	
CO1	The students will learn scientific approaches/techniques that are used to investigate various diseases, historical background, general concepts of the immune system
CO2	The students will learn scientific approaches/techniques that are used to investigate Antigens and haptens: Properties, foreignness, molecular size, heterogeneity, B and T cell epitopes; T dependent and T independent antigens.
CO3	The students will learn scientific approaches/techniques that are used to investigate Mechanism of humoral and cell mediated immune response...
CO4	The students will learn scientific approaches/techniques that are used to investigate Laboratory tests for demonstration of antigen antibody reaction such as agglutination, precipitation, ELISA, RIA, Immune of fluorescence.
CO5	The students will learn scientific approaches/techniques that are used to investigate Rheumatologic diseases, etiology and pathogenesis and lab investigations.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	INTRODUCTION AND HISTORY OF IMMUNOLOGY	<ul style="list-style-type: none"> Historical background, general concepts of the immune system, innate and adaptive immunity; active and passive immunity; primary and secondary immune response. Cell and organs of immune system, Phagocytosis. 	6	CO1
2	ANTIGENS AND ANTIBODY	<ul style="list-style-type: none"> Antigens and haptens: Properties, foreignness, molecular size, heterogeneity, B and T cell epitopes; T dependent and T independent antigens. Antibodies: Historical perspective of antibody structure; structure, function and properties of the antibodies; different classes, subclasses and biological activities of antibodies; concepts of antibody diversity. Introduction & mechanism of hybridoma technology, monoclonal antibodies, polyclonal antibody. 	6	CO2
3	IMMUNE RESPONSE, MHC AND COMPLEMENT	<ul style="list-style-type: none"> Mechanism of humoral and cell mediated immune response Introduction of Major Histocompatibility Complex, organization of MHC and inheritance in humans; Antigen presenting cells, antigen processing and presentation. Complement system and complement fixation test. 	6	CO3
4	ANTIGEN-ANTIBODY REACTION	<ul style="list-style-type: none"> Laboratory tests for demonstration of antigen antibody reaction such as agglutination, precipitation, ELISA, RIA, immune of fluorescence, PCR 	6	CO4
5	RHEUMATOLOGICAL DISORDERS	<ul style="list-style-type: none"> Rheumatological diseases, etiology and pathogenesis and lab investigations, vaccine production and vaccination schedule. 	6	CO5

Reference Books:

- Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
- Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
- Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.
- Delves P, Martins, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley- Blackwell Scientific Publication, Oxford.

e-Learning Source:

- https://en.wikipedia.org/wiki/Immune_system
- <https://www.creative-diagnostics.com/blog/index.php/immunogen-antigen-hapten-epitope-and-adjuvant/>
- <https://www.webmd.com/rheumatoid-arthritis/an-overview-of-rheumatic-diseases>

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	
DT205	IMMUNOLOGY & SEROLOGY - I	✓	✓	✓	✓		✓	✓	3,4



Integral University, Lucknow

Effective from Session: 2024-25

Course Code	DT207	Title of the Course	IMMUNOLOGY, SEOLOGY & MICROBIOLOGY LAB	L	T	P	C
Year	II	Semester	III	0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The student will be taught about different type of Clinical aspects of Immunology, Serology & Microbiology according to respective SOPs.						

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.	Mappe d 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 of G-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. To perform PT and Calculate INR.		CO4
12	APTT	12. To perform APTT.		CO4
13	SICKLE TEST	13. To perform sickling test.		CO5
14	PLASMA HB	14. Determination of Plasma Hemoglobin.		CO5
15	RETICULOCYTE COUNT	15. To perform reticulocyte count.		CO5

Reference Books:

1. Praful B. Godkar: Textbook of Medical Laboratory Technology
2. Dr. Ramnik Sood: 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.
DT207	IMMUNOLOGY, SEOLOGY & MICROBIOLOGY 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	DT208	Title of the Course	PATHOLOGY LAB				L	T	P	C
Year	II	Semester	III				0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil							
Course Objectives	The student will be taught about different type of Clinical aspects of Pathology according to respective SOPS									

Course Outcomes	
CO1	Students will be able to learn about Glasswares used in histopathology lab, alcohol preparation, formalin preparation
CO2	Students will be able to learn about honing and stopping technique, grossing of tissue, tissue processing
CO3	Students will be able to learn about section cutting techniques, smear fixation techniques
CO4	Students will be able to learn about H & E staining techniques
CO5	Students will be able to learn about mounting and preservation of slides

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	GLASSWARE	1. Demonstration of glass wares and equipment used in histopathology lab.	60	CO1
2	ALCOHOL PREPARATION	2. To prepare alcohol of different concentration.		CO1
3	FORMALIN PREPARATION	3. To prepare formalin from stock solution.		CO2
4	HONING AND STOPPING	4. To sharp knife by honing and stopping.		CO2
5	GROSSING OF TISSUE	5. Grossing of tissue.		CO3
6	TISSUE PROCESSING	6. To perform tissue processing by manual method.		CO3
7	SECTION CUTTING	7. To perform section cutting of paraffin embedded tissue.		CO4
8	SMEAR FIXATION	8. To fix the smear on glass slide.		CO4
9	H & E STAINING	9. To perform hematoxylin and eosin staining		CO5
10	PRESERVATION OF SLIDE	10. Mounting and preservation of slide		CO5

Reference Books:	
1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications	
2. CFA Culling, (1974), Handbook of Histopathological and Histochemical techniques: Including Museum Techniques, 3rd edition, Butter worth publishers.	
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	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		Attributes							SDGs No.
Course Code	Course Title	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
DT208	PATHOLOGY LAB	<i>r</i>	<i>r</i>	<i>r</i>	<i>r</i>		<i>r</i>	<i>r</i>	3,4



INTEGRAL UNIVERSITY, LUCKNOW
INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

BACHELOR OF SCIENCE IN DIALYSIS TECHNOLOGY
(B.Sc. DT)

SYLLABUS

YEAR/ SEMESTER: II/IV



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

Program: B.Sc. Dialysis Technology

Semester-IV

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	DT210	Renal Dialysis Technology-II	Core	2	1	0	40	20	60	40	100	2:1:0	3
2	DT211	Applied Pharmacology	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	DT212	Clinical Biochemistry	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	DT213	Applied Microbiology	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	DT214	Basics of Patient Care	Core	2	1	0	40	20	60	40	100	2:1:0	3
6	DT215	Management of Dialysis Unit	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	DT216	Clinical Biochemistry Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	DT217	Renal Dialysis Technology-II Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
3	DT218	Clinical Posting	Core	0	0	4	40	20	60	40	100	0:0:2	3
Total				12	06	16	400	200	600	400	1000	26	25

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	DT210	Renal Dialysis Technology-II	Core	√	√	√	√		√	√	3,4
2	DT211	Applied Pharmacology	Core	√	√	√	√		√	√	3,4
3	DT212	Clinical Biochemistry	Core	√	√	√	√		√	√	3,4
4	DT213	Applied Microbiology	Core	√	√	√	√		√	√	3,4
5	DT214	Basics of Patient Care	Core	√	√	√	√		√	√	3,4
6	DT215	Management of Dialysis Unit	Core			√		√			3,4
PRACTICAL											
1	DT216	Clinical Biochemistry Lab	Core	√	√	√	√		√	√	3,4
2	DT217	Renal Dialysis Technology-II Lab	Core	√	√	√	√		√	√	3,4
3	DT218	Clinical 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 Session: 2024-25							
Course Code	DT210	Title of the Course	RENAL DIALYSIS TECHNOLOGY-II	L	T	P	C
Year	II	Semester	IV	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				

Course Objectives	The course is designed to help the students to develop an understanding of the basic concepts, Principles, equipment, composition and membrane of dialysis, Water treatment and reuses, anticoagulation therapy in dialysis with emphasis on clinical application to practice.
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Course Outcomes	
CO1	Students will be able to understand basic concepts of Dialysis
CO2	Students will be able to gain knowledge on Water Treatment and Reuse
CO3	Students will be able to understand functions of Equipment and Dialysis Membrane
CO4	Student will be able to understand Composition of Dialysate and Anticoagulation
CO5	Students will be aware of Complications during hemodialysis

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Dialysis	<ol style="list-style-type: none"> 1. The concept (Brief history, definition, mechanism) Components of Dialysis Access, blood flow, anticoagulant, dialysate, initiation of dialysis, Indications of dialysis). 2. Hemodialysis: Basics (Blood circuit: tubing, pump, dialyzer, flow rate, dialysate circuit, concentrates, delivery systems, flow rate). 3. Peritoneal Dialysis: Basic concepts. 4. Solute transport mechanism in both types of dialysis 5. Dialysis teams: Dialysis Team (Doctors, Technologist, Nurses, Technician, Renal Dietician) rights, responsibilities and relationship with patients 	8	CO1
2	Water Treatment and Reuse	<ol style="list-style-type: none"> 1. Purpose 2. Preventing harm to patients 3. Preventing harm to equipment. 4. How does water become impure? 5. Types of contaminants and effects on Patients - Microbiological pollution - Solid impurities - Chemical impurities. 6. Components of water treatment plant & their arrangement (Feed water components, R.O process). 7. Monitoring water treatment plant continuously. 8. Periodic monitoring Microbiological testing -Chemical monitoring (Chloramines, Na+, K+) - Routine blood chemistries, Monitoring Pt. Symptoms. 9. Disinfection 10. Water quality 11. AAMI Standard Ultra-pure water 12. Dialyzer reprocessing and reuse of dialyzers 	8	CO2
3	Equipment and Dialysis Membrane	<ol style="list-style-type: none"> 1. Machine front panel 2. Blood Circuit 3. Dialysate Circuit. 4. Proportioning system 5. Various Alarms and safety profile 6. Temperature 7. UF Controller 8. Disinfection 9. Characteristics (Molecular weight cut off; Ultrafiltration coefficient (Kuf); Mass transfer coefficient (KoA) and efficiency; Low and high flux; Clearance(K) Biocompatibility, Newer membranes/ High performance membranes 	8	CO3
4	Composition of Dialysate and Anticoagulation	<ol style="list-style-type: none"> 1. The concept (Brief history, definition, mechanism) Components of Dialysis Access, blood flow, anticoagulant, dialysate, initiation of dialysis, Indications of dialysis). 2. Types of dialysate solution 3. Composition of acid, bicarbonate 4. Electrolytes managed through dialysate solution 5. RO water for composition, mixing proportional 6. Anticoagulation • Heparin including Low Molecular Weight • Heparin • Warfarin • Regional citrate anticoagulation • Antiplatelet Drugs • Thrombolytic agents 	8	CO4
5	Complications during hemodialysis	<ol style="list-style-type: none"> 1. Biochemical investigations for dialysis patients and its significance. 2. Urea Kinetic modelling. 3. Mechanisms of solute transport 4. Solute removal from the perspective of the dialyzer 5. Concept of clearance • URR, spKt/V, eKt/V • Solute removal from the patient perspective • Access re-circulation • Cardiopulmonary re-circulation • Urea nitrogen generation 	8	CO5

Reference Books:

1. Kasi Visweswaran, Handbook of dialysis, Bhalani Publication 1st Edition, 2022.
2. Anjani Sharma, Handbook of Dialysis Technician, Mount book Pub, 2nd edi, 2022.
3. Allen R Nisenson, Handbook of Dialysis Technology, Elsevier, 1st Edi, 2017.
4. Judith.Z.Kallenbach, Review of Hemodialysis, Elsevier, 9th Edition, 2016.
5. John T Daugirdas & Peter G Blake, Hand Book of Dialysis, Wolters Kluwer Pvt, 5th Edi, 2014.

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.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
DT210	RENAL DIALYSIS TECHNOLOGY-II	f	f	f	f		f	f	3,4



Integral University, Lucknow

Effective from Session: 2024-2025							
Course Code	DT213	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	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	
DT213	APPLIED MICROBIOLOGY	√	√	√			√	√	3,4



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	DT216	Title of the Course	CLINICAL BIOCHEMISTRY LAB	L	T	P	C
Year	II	Semester	III	0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	This paper gives a brief understanding about various types of function tests, acid base balance and associated disorders.						

Course Outcomes	
CO1	Students will be able to gain knowledge about Bilirubin, SGOT conc, SGPT conc
CO2	Students will be able to gain knowledge about ALP Conc, total and free acidity
CO3	Students will be able to gain knowledge about CPK test, CK-MB test
CO4	Students will be able to gain knowledge about serum sodium Conc, serum potassium conc
CO5	Students will be able to gain knowledge about uric acid conc, phosphorus conc

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mappe d 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		CO2
4		4. To determine ALP Conc		CO2
5		5. To determine total and free acidity.		CO3
6		6. To perform CPK test		CO3
7		7. To perform CK-MB test.		CO4
8		8. To determine serum sodium conc		CO4
9		9. To determine serum potassium conc.		CO5
10		10. To determine uric acid conc.		CO5
11		11. To determine phosphorus conc.		CO5

Reference Books:	
1.	DMVasudevan,(2011),TextbookofMedicalBiochemistry,6thedition, Jaypee Publishers
2.	MNChatterjee&RanaShinde,(2012),TextbookofMedicalBiochemistry,8thedition,JayppePublications.
3.	Singh &Sahni,(2008),Introductory Practical Biochemistry,2ndedition,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,6thedition,ElsevierPublications
e-Learning Source:	
1.	https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt
2.	https://www.ucsfhealth.org/medical-tests/seminal-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	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.
DT216	CLINICAL BIOCHEMISTRY LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		<i>r</i>	<i>r</i>	<i>r</i>	<i>r</i>		<i>r</i>	<i>r</i>	



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	DT218	Title of the Course	Clinical Posting	L	T	P	C
Year	II	Semester	IV	0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The student will be taught about different type of Clinical aspects of Dialysis according to respective SOPS.						

Course Outcomes	
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:	DT218
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 POSTING ASSESSMENT FORM

(Name and signature of In-charge)

(Head, Paramedical)

GUIDELINES FOR CLINICAL TRAINING PROGRAM

The students of the Post Graduate BDT 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. Dialysis Technology	IIrd Year/ IIIrd Semester	4 Months
2.		IIrd 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. Dialysis 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

BDT- 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:

Cases during 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
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.	
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics		
DT218	Clinical Posting	√	√	√				√	√	3,4,11