



INTEGRAL UNIVERSITY, LUCKNOW

INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH

DEPARTMENT OF PARAMEDICAL SCIENCES

**BACHELOR OF SCIENCE IN NUTRITION AND
DIETETICS
(B. Sc. ND)**

SYLLABUS

YEAR/ SEMESTER: II/III



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

Program: BSc. Nutrition and Dietetics

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	ND201	Food Processing & Preservation	Core	2	1	0	40	20	60	40	100	2:1:0	3
2	ND202	Nutritional Microbiology	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	ND203	Medical Biochemistry-II	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	ND204	Fundamental of Nutrition-II	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	ND205	Introduction to Food Science	Core	2	1	0	40	20	60	40	100	2:1:0	3
6	ES101	Environmental sciences	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	ND206	Nutritional Microbiology Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	ND207	Medical Biochemistry-II lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
3	ND208	Fundamental of Nutrition-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	ND201	Food Processing and Preservation	Core	√	√	√	√		√	√	3,4
2	ND202	Nutritional Microbiology	Core	√	√	√	√		√	√	3,4
3	ND203	Medical Biochemistry-II	Core	√	√	√	√		√	√	3,4
4	ND204	Fundamental of Nutrition-II	Core	√	√	√	√		√	√	3,4
5	ND205	Introduction to Food Sciences	Core	√	√	√	√		√	√	3,4
6	ES101	Environmental Science	Core			√		√			3,4
PRACTICAL											
1	ND206	Nutritional Microbiology Lab	Core	√	√	√	√		√	√	3,4
2	ND207	Medical Biochemistry -II lab	Core	√	√	√	√		√	√	3,4
3	ND208	Fundamental of Nutrition-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 (ESE)



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ND201	Title of the Course	FOOD PROCESSING & PRESERVATION	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	10+2 with Biology	Co-requisite	Nil				
Course Objectives	1. Critical Thinking Apply the knowledge of nutrition and dietetics, relate to scientific issues so as to prevent or treat diseases being faced by the humans 2. Design/development of solutions Develop innovative food products or substitutes or alternate solutions to create value and wealth for the betterment of the individual and society at large.						

Course Outcomes	
CO1	Students will be able to understand the history and importance of food processing and preservation.
CO2	Students will be able to understand about the common food additives.
CO3	Students will be able to understand about the methods of preservation.
CO4	Students will be able to about the definition, role and remedial measures regarding food spoilage.
CO5	Students will be able to understand about the preserved food.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PRESERVATION	1. History, importance. 2. Definition, needs, and principles of food preservation. 3. Methods of low and high temperature. 4. Dehydration – Types, objectives, and principles of dehydration, steps involved in the dehydration process, merits and demerits- effects on nutritional value in dehydrated foods.	6	CO1
2	FOOD ADDITIVES	1. Food additives – Definition; Preservatives – class 1 and class 2 preservatives, colors, flavouring agents, sweeteners, emulsifiers and stabilizers, leavening agents, antioxidants, flour improvers. 2. Government regulations.	6	CO2
3	PRESERVATION TYPES	1. Bacteriostatic – Dehydration-types of dehydration (Sun drying, spray drying) Pickling, Salting, Smoking, Freezing – slow and quick, merits and demerits. 2. Bactericidal – Canning steps involved in canning, Irradiation, and microwave cooking.	6	CO3
4	FOOD SPOILAGE	1. Definition, role of microorganisms in food spoilage, types of food spoilage, causes of spoilage, factors affecting spoilage, and kinds of spoilage – perishable and non-perishable. 2. Anaerobic and aerobic microorganisms involved in food preservation – mold, fungi, bacteria. 3. Remedial measures to be taken on spoilage. 4. Storage conditions – storage conditions leading to food spoilage.	6	CO4
5	PRESERVED FOODS	1. Products using sugar - squash, jam, jelly 2. Products using salt - tomato ketchup, pickles, chutneys. 3. Preservation using vinegar 4. Preparation of dehydrated products – papads, vathal, vadams and dehydrated vegetables	6	CO5

Reference Books:	
1.	Swaminathan (1995): “Food & Nutrition”, The Bangalore Printing & publishing co ltd., Vol I, Second Edition, Bangalore.
2.	Srilakshmi (1997): “Food Science”, New Age International (P) Ltd, Publishers, Pune.
3.	Mudambi .R. Sumathi & Rajagpal M.V (1983), “Foods & Nutrition”, Willey Eastern Ltd, Second Edition, New Delhi.
4.	Thangam.E.Philip(1965): Modern Cookery, Orient Longman, II edition, Vol II, Bombay.
5.	Neiman N. Catherine, (1990), “Nutrition”, Wm.C. Brown Publishers. USA.

e-Learning Source:	
1.	https://youtu.be/blqShM0vR6s?si=jNIMswiY5NN9GW -
2.	https://youtu.be/2PgVWLjK0gE?si=ljwTU4RiyM-b1Qda
3.	https://youtu.be/DNDipuD1Y9c?si=5D7oqc7Isxah7aMx

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

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
ND201	FOOD PROCESSING & PRESERVATION	√	√	√			√	√	3,4



Integral University, Lucknow

Effective from Session:2023-24							
Course Code	ND202	Title of the Course	NUTRITIONAL MICROBIOLOGY	L	T	P	C
Year	II	Semester	III	3	1	0	4
Pre-Requisite	NIL	Co-requisite	NIL				
Course Objectives	The Student will be able to Understand Basic concepts of Nutritional Microbiology as needed for the study and practice of Nutritional Microbiology.						

Course Outcomes	
CO1	To know the Introduction, History and Instrumentation Technique
CO2	To know about Bacterial, Viral, Fungal and parasitic pathogens responsible for food poisoning
CO3	To learn the skills of Staining techniques and Identification methods (Manual and Automated)
CO4	To learn the different Culture media and Sterilization techniques
CO5	To know the causative agents of food borne disease

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	HISTORY AND DEVELOPMENT OF MICROBIOLOGY	Importance and significance of Microorganisms in food science. Factors affecting the growth of micro-organisms in food – Intrinsic and Extrinsic parameters	6	CO1
2	DETERMINATION OF MICROORGANISMS AND THEIR PRODUCTS IN FOOD	Sampling, Sample Collection, Transport and Storage, and Sample Preparation for analysis. Microscopic and Culture-dependent Methods- Direct microscopic observation, culture, enumeration and isolation Methods; Chemical and Physical methods	6	CO2
3	PROTECTION AND PRESERVATION OF FOODS	Chemical, Modified Atmosphere, Radiation in foods from the Microbiological angle. Indicators of water and food safety and quality: Microbiological criteria of foods and their Significance. The HACCP and ISO systems for food safety.	6	CO3
4	FOOD SPOILAGE	Characteristic features, dynamics and significance of spoilage of different groups of foods - Cereal and cereal products, vegetables and fruits, meat poultry and sea foods, Milk and Milk products, and Packed and Canned foods.	6	CO4
5	FOOD BORNE DISEASES	Bacterial food-borne diseases, Mycotoxins: Aflatoxicosis, Deoxy-nivalenol Mycotoxins, Ergotism, Food Borne Animal Parasites Protozoa, Food Borne Viral Pathogens.	6	CO5

Reference Books:

1. Prescott LM Harley JP and Klein DA (2006). Microbiology (7th edition) McGraw Hill, New York.
2. Frazier, W.C. (1988) Food Microbiology, Mc Graw Hill Inc. 4th Edition.
3. Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
4. Yasmine Motarjemi and Martin Adams. (2006) Emerging Foodborne pathogen- Wood Head Publishing England.
5. Arun, K Bhunia. (2008) Foodborne microbial pathogens: Mechanisms and pathogenesis. Springer.
6. Thomas J. Montville, Karl R. Matthews, Kalmia E. Kniel (2012). Food Microbiology: An Introduction, American Society for Microbiology.

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

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.
ND202	NUTRITIONAL MICROBIOLOGY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	3,4
		√	√	√	√		√	√	



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ND203	Title of the Course	MEDICAL BIOCHEMISTRY-II	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	This course deals with fundamentals of metabolism, metabolic disorders, laboratory test and instruments of Clinical Biochemistry.						

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

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

Reference Books:	
1. D M Vasudevan, Text book of Medical Biochemistry, Jaypee Publishers.	
2. M N Chatterjee & Rana Shinde, Text book of Medical Biochemistry, Jaypee Publications.	
3. Michael Cox, David L. Nelson, Lehninger Principles of Biochemistry, 7 th edition, W.H. Freeman.	
4. <u>Ranjana Chawla</u> , Practical Clinical Biochemistry: Methods and Interpretations.	
e-Learning Source:	
1. https://youtu.be/t5DvF5OVr1Y	
2. https://youtu.be/gggC9vctvBQ	
3. https://youtu.be/ufvZ8bYtyO8	
4. https://youtu.be/Q6R4o-oECxs	

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

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

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
ND203	MEDICAL BIOCHEMISTRY-II	√	√	√	√		√	√	3,4



Integral University, Lucknow

Effective from Session: 2023-24

Course Code	ND204	Title of the Course	FUNDAMENTALS OF NUTRITION-II	L	T	P	C
Year	II	Semester	III	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The course "Fundamentals of Food and Nutrition" aims at developing basic understanding about nutrition, its effect on human health and newer advances in food technology. This course encompasses physiological, biochemical and social aspects of food and discusses relationship between metabolites and human health. Moreover, the course is focused on the advances in the most emerging area of applied science of Nutraceuticals (where food is the medicine). The knowledge of nutrition under extreme climate conditions, space nutrition, and sports nutrition empowers students' knowledge and skills to utilize food as a powerful tool for physical, mental, and social wellbeing.						

Course Outcomes

CO1	Understand the role of minerals in the body
CO2	Understand the role of vitamins in the body
CO3	Understand the role of water and electrolyte in the body
CO4	Knowledge of nutrition and health education
CO5	Understand and different methods of communications.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	ROLE OF MINERAL IN BLOOD	Functions, Sources, Bioavailability. Deficiency Disease. Deficiency Disease-Treatment and Prevention	8	CO1
2	ROLE OF VITAMINS IN BLOOD	Vitamins (water & fat soluble) - definition, classification & functions. Deficiency Disease. Deficiency Disease- Treatment and Prevention.	8	CO2
3	WATER AND ELECTROLYTE BALANCE	Water -as a nutrient, function, and source. Electrolyte Balance. Acid-base balance.	8	CO3
4	NUTRITION AND HEALTH STATUS OF THE COMMUNITY	Earning and Working with the Community. Community Nutrition and Health.Factors Influencing Community Health and Nutrition	8	CO4
5	COMMUNICATIONN METHOD	Group Communication Methods Mass Communication Media. Presentation of Selected. Communication Media, Preparation, Machine Operated Devices—Planning and Preparation.	8	CO5

Reference Books:

1. Nutrition Science- B. Srilakshmi
2. Text of Human Nutrition-Anjana Agarwal, Shobha Agarwal

e-Learning Source:

1. <https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt>
2. <https://www.ucsfhealth.org/medical-tests/semen-analysis#:~:text=Seamen%20analysis%20is%20one%20of%20a%20male%20infertility%20.>

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	-	-	1	-	3	3	2	2	-	2	2	-	-	-	-	1
CO2	2	-	-	2	-	3	2	2	1	-	2	3	-	-	-	-	2
CO3	2	-	-	1	-	3	3	1	2	-	1	2	-	-	-	-	1
CO4	2	-	-	1	-	3	3	2	1	-	2	3	-	-	-	-	1
CO5	2	-	-	2	-	3	2	2	1	-	2	2	-	-	-	-	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		
ND204	FUNDAMENTALS OF NUTRITION-II	√	√	√				√	√	3,4



Integral University, Lucknow

Effective from Session: 2024-25

Course Code	ND205	Title of the Course	INTRODUCTION TO FOOD SCIENCE	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The course "Fundamentals of Food and Nutrition" aims at developing basic understanding about nutrition, its effect on human health and newer advances in food technology. This course encompasses physiological, biochemical and social aspects of food and discusses relationship between metabolites and human health. Moreover, the course is focused on the advances in the most emerging area of applied science of Nutraceuticals (where food is the medicine). The knowledge of nutrition under extreme climate conditions, space nutrition, and sports nutrition empowers students' knowledge and skills to utilize food as a powerful tool for physical, mental, and social well-being.						

Course Outcomes: After the successful course completion, learners will develop following attributes:

CO1	Student will be able to understand the basic introduction about the food sciences in different aspects.
CO2	To know about the nutritive values of different cereals and pulses and its advantages in cookery.
CO3	To know the selection and effect of cooking on different vegetables and fruits.
CO4	To understand the preservation, types, and composition of different milk and meat products.
CO5	To know the composition of different types of fats and oil products and the nutritive values of selected spices.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Food Science	<ul style="list-style-type: none"> Food Science, Food, Nutrients, Nutritional status, Mal – nutrition-under nutrition over nutrition, Hunger- Hollow Hunger, Appetite Satiety and Health. Food groups - Basic five food groups, Nutritional classification of foods - energy-yielding, bodybuilding and protective foods. Methods of cooking - Moist, dry and combination heat methods of cooking, Merits and demerits. Microwave cooking- principle, Merits & demerits. 	6	CO1
2	Cereals &Pulses	<ul style="list-style-type: none"> Cereals: Structure and nutritive value of rice and wheat, Gelatinization, Process of milling and malting -wheat, Rice, Gluten formation, Nutritive value of millets - ragi, bajra. Pulses: Germination process, factors affecting cooking quality of pulses, composition, nutritive value, and its advantages in cookery. 	6	CO2
3	Vegetables and Fruits	<ul style="list-style-type: none"> Vegetables – Selection of vegetables, Nutritive value, Changes in nutritive value before and after cooking, Effect of cooking on the vegetable pigments.- chlorophyll, carotenoids, anthocyanin, anthoxanthin. Fruits- Classification, nutritive value, ripening of fruits, Effect of browning and its prevention , Storage of fruits. 	6	CO3
4	Milk and meat products	<ul style="list-style-type: none"> Milk and Milk Products: Types of milk , pasteurization of milk , composition and nutritive value, milk products – cheese, paneer and khoa Egg:Structure, composition and nutritive value,Qualitative determination of egg and its role in cookery . Meat:Structure, composition and nutritive value of meat, cutting process of meat, cooking changes in meat, and tenderness of meat. Poultry-classification,Nutritive value, Selection and cooking methods poultry Fish -selection of fish,Structure, composition and nutritive value. 	6	CO4
5	Fats, Sugar, Beverages and Spices	<ul style="list-style-type: none"> Fats and Oils- composition of common fats and oils, smoking temperature, rancidity and role of fats and oils in cookery. Sugar – Nutritive value, sugar related products, stages of sugar cookery, Crystallization, Factors affecting crystallization. Beverages: classification, nutritive value - coffee, tea, cocoa, milk based beverages, fruit juices and aerated beverages. Spices and condiments – Types and use in Indian cookery, Medicinal value. 	6	CO5

Reference Books:

- Swaminathan (1995): "Food & Nutrition", The Bangalore Printing & publishing co ltd., Vol I, Second Edition, Bangalore.
- Srilakshmi (1997): "Food Science", New Age International (P) Ltd, Publishers, Pune.
- Mudambi .R. Sumathi & Rajagpal M.V (1983), "Foods & Nutrition", Willey Eastern Ltd, Second Edition, New Delhi.
- Thangam.E.Philip(1965): Modern Cookery, Orient Longman, II edition. Vol II, Bombay.

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
ND205	INTRODUCTION TO FOOD SCIENCES	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
		√	√	√	√		√	√	3,4



Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ND207	Title of the Course	MEDICAL BIOCHEMISTRY-II LAB	L	T	P	C
Year	II	Semester	III	0	0	4	2
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	This course deals with fundamentals of metabolism, metabolic disorders, laboratory test and instruments of Clinical Biochemistry.						

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

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	PICRATE METHOD.	1. Estimation of Serum Creatinine by Alkaline Picrate method.	60	CO1
2	BENEDICT'S/ URISTIX METHOD	2. Toperform urine sugar by Benedict's/ Uristix method.		CO1
3	ROTHERA NITROPRUSSIDE TEST	3. Toperform urine Ketone body analysis by Rothera Nitroprusside test.		CO2
4	SERUM AMYLASE	4. Estimation of Serum Amylase.		CO2
5	SERUM LIPASE	5. Estimation of Serum Lipase.		CO3
6	MALLOY–EVELYN METHOD	6. Estimation of Serum Total Bilirubin 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, Darshan P. Godkar, Textbook of Medical Laboratory Technology.	
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

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
ND207	MEDICAL BIOCHEMISTRY-II LAB	√	√	√	√		√	√	3,4

