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 Paramedical Sciences

Study and Evaluation Scheme

Program: B.Sc. 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 Studies	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 Studies	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=5D7oqq71sxah7aMx**

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

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

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

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
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 Mycotoxicosis, 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,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.
ND203	MEDICAL BIOCHEMISTRY-II	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		√	√	√	√		√	√	**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' knowledgeand skills to utilize food as a powerful tool for physical, mental, and social wellbeing.						

Course Outcomes	
CO1	Understand the sole 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. DeficiencyDisease. 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=Semen%20analysis%20is%20one%20of,have%20a%20male%20infertility%20.

	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	-	-	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-LowCorrelation;2-ModerateCorrelation;3-SubstantialCorrelation Attributes & SDGs

Course Code	**Course Title**	**Attributes**							**SDGs No.**
ND204	FUNDAMENTALS OF NUTRITION-II	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment& Sustainability	Human Value	Professional Ethics	
		√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**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 newe advances in food technology. This course encompasses physiological, biochemical and social aspects of food and discusses rela tionship 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**	• 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**	• 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**	• 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 andits prevention , Storage of fruits.	6	CO3
4	**Milk and meat products**	• 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**	• 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:

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.

e-Learning Source:

1. https://en.wikipedia.org/wiki/Immune_system
2. https://www.creative-diagnostics.com/blog/index.php/immunogen-antigen-hapten-epitope-and-adjuvant/
3. 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	-

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

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

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

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

e-Learning Source:

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

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

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

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

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ND206**	**Title of the Course**	**NUTRITIONAL MICROBIOLOGY LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**0**	**0**	**4**	**2**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	• Students learn to integrate science with day to day life, nutrition, quality control and laws governing the food safety. • Can become independent researchers and make impactful contributions to the field of Food Microbiology.						

Course Outcomes	
CO1	Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments.
CO2	Factors affecting the growth and survival of microorganisms in foods
CO3	Gaining knowledge and hands on experience on isolation of microbes from processing plants and equipments, D value, z value determination, bioassay of vit b12 etc.
CO4	Methods for studying microbes and their products in food stuffs Spoilage, food preservation with chemicals, irradiation, low and high temperatures, high pressure, modified atmosphere, low humidity and drying
CO5	Manufacture of fermented foods: Dairy products,Meat and fishery products; Plant products, Breads, Beverages, The hazard analysis and critical control point (HACCP) concept in controlling microbiological quality of foods; Predictive models

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mappe d 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	**MICROSCOPY**	1. Demonstration of Microscope and its parts.		CO4
12	**GLASSWARES**	**2.** Demonstration of glassware used in microbiology.		CO4
13	**AUTOCLAVES**	3. Demonstration of autoclave and sterilization of glasswares.		CO5
14	**HOT AIR OVEN**	4. Demonstration of Hot air oven and sterilization of glasswares.		CO5
15	**GRAM STAINING**	5. To perform Gram staining.		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.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	-	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.**
ND206	NUTRITIONAL 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	**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, SerumAmylase, 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 byBenedict's/ Uristix method.		CO1
3	**ROTHERA NITROPRUSSIDE TEST**	3. Toperform urine Ketone bodyanalysis by Rothera Nitroprusside test.		CO2
4	**SERUM AMYLASE**	4. Estimation of Serum Amylase.		CO2
5	**SERUM LIPASE**	5. Estimation of Serum Lipase.		CO3
6	**MALLOY–EVELYN METHOD**	6. Estimation of Serum Total Bilirubin byMalloy–Evelyn method.		CO3
7	**BCG METHOD**	7. Estimation of Serum Albumin by BCG method and calculation of Globulin & A/Gratio.		CO4
8	**URICASE/ PAP METHOD**	8. Estimation of Serum uric acid by Uricase/ PAP method.		CO4
9	**SEMI AUTOANALYZER**	9. Demonstration of Semi Autoanalyzer.		CO5
10	**FLAME PHOTOMETER**	10. Demonstration of Flame Photometer.		CO5

Reference Books:

1. Ranjna Chawla, Practical Clinical Biochemistry: Methods and Interpretations.
2. Praful B. Godkar,DarshanP.Godkar, Textbook of Medical Laboratory Technology.

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

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**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ND208**	**Title of the Course**	**FUNDAMENTAL OF NUTRITION-II-LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**III**	**0**	**0**	**4**	**2**
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 foodand 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 use and care of kitchen equipment
CO2	Understand the methods of food preparation for LIG
CO3	Understand the methods of food preparation for MIG
CO4	Understand the methods of food preparation for 1--110
CO5	Understand the use of nutritional educational amulets

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**USE AND CAREOF KITCHEN EQUIPMENT**	1. Demonstration and uses 2. Food amid 3. Weight and Measures	60	CO1,CO2
2	**FOOD RECREATION**	1. Snacks 2. Main Course 3. Beverages		CO3
3	**FOOD PREPARATION**	1. Snacks 2. Main Course 3. Beverages		CO4
4	**NUTRITIONEDUCATION**	1. Pamphlets 2. PEM 3. Anemia		CO5

Reference Books:

1. Srinivasan, A.V. (ed), Managing a Modern Hospitals, Response Books, New Delhi, 2000
2. Wiley Blackwell, Improving Patient care BMJI Books

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%20.
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	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.**
ND208	FUNDAMENTAL OF NUTRITION-II-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 BASIC MEDICAL SCIENCES

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

SYLLABUS

YEAR/ SEMESTER: II/IV

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

Program: B.Sc. Nutrition and Dietetics — 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	ND209	Nutritional; Biochemistry	Core	2	1	0	40	20	60	40	100	2:1:0	3
2	ND210	Principles of Nutrition	Core	2	1	0	40	20	60	40	100	2:1:0	3
3	ND211	Food Analysis and Quality Control	Core	2	1	0	40	20	60	40	100	2:1:0	3
4	ND212	Clinical Biochemistry	Core	2	1	0	40	20	60	40	100	2:1:0	3
5	ND213	Basic Dietetics and Nutritional Assessment	Core	2	1	0	40	20	60	40	100	2:1:0	3
PRACTICAL													
1	ND214	Nutritional Biochemistry Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
2	ND215	Food Analysis and Quality Control Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
3	ND216	Clinical Biochemistry Lab	Core	0	0	2	40	20	60	40	100	0:0:1	1
4	ND217	Clinical Posting	Core	0	0	10	40	20	60	40	100	0:0:7	7
Total				**10**	**05**	**16**	**400**	**200**	**600**	**400**	**1000**	**25**	**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	ND209	Nutritional; Biochemistry	Core	√	√	√	√		√	√	3,4
2	ND210	Principles of Nutrition	Core	√	√	√	√		√	√	3,4
3	ND211	Food Analysis and Quality Control	Core	√	√	√	√		√	√	3,4
4	ND212	Clinical Biochemistry	Core	√	√	√	√		√	√	3,4
5	ND213	Basic Dietetics and Nutritional Assessment	Core	√	√	√	√		√	√	3,4
PRACTICAL											
1	ND214	Nutritional Biochemistry Lab	Core	√	√	√	√		√	√	3,4
2	ND215	Food Analysis and Quality Control Lab	Core	√	√	√	√		√	√	3,4
3	ND216	Clinical Biochemistry Lab	Core	√	√	√	√		√	√	3,4
4	ND217	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 from Session: 2024-25							
Course Code	**ND209**	**Title of the Course**	**NUTRITIONAL BIOCHEMISTRY**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	**3**	**1**	**0**	**4**
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	The following syllabus has been developed . so that by the end of this course, students will have a comprehensive understanding of the principles of nutrition, energy metabolism, and the biochemical assessments related to overall health and wellness.						

Course Outcomes	
CO1	To learn the basic principles of nutrition, energy metabolism, and dietary requirements for various age group
CO2	To learn and gain knowledge of essential minerals and vitamins, their functions, sources, and the consequences of deficiencies.
CO3	To know about the significance of water metabolism, its balance, and the physiological processes involved in homeostasis.
CO4	To learn about the classification, sources, and physiological importance of carbohydrates, fats, and proteins in the human diet.
CO5	To learn about biochemical tests related to liver, kidney, and glucose metabolism, essential for clinical evaluations.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**INTRODUCTION TO NUTRITION AND ENERGY METABOLISM**	1. Food and Nutrients: Food as a source of essential nutrients; functions of food. 2. Core Concepts: Definitions of nutrition, nutrients, adequate nutrition, optimum nutrition, good nutrition, and malnutrition. 3. Energy Measurement: Units of energy, measurement of food energy via Bomb calorimeter, calorific values, and respiratory quotient (RQ) of food stuffs. 4. Metabolic Essentials:Basic Metabolic Rate (BMR): Measurement techniques and factors affecting it.Specific Dynamic Action (SDA) of food. 5. Dietary Recommendations: Recommended Nutrient Intakes (RNI) and Recommended Dietary Allowances (RDA) tailored for different age groups.	6	CO1
2	**MINERALS AND VITAMINS**	1. Minerals:Classification: Macronutrients and Micronutrients. Functions, sources, bioavailability, and deficiencies. 2. Vitamins: Classification: Fat-soluble vitamins and water-soluble vitamins (including B-complex members).Bioavailability, sources, functions, and deficiency impacts.	6	CO2
3	**WATER METABOLISM**	1. Fluid Dynamics: a) Distribution and composition of body fluids: Extracellular Fluid (ECF) and Intracellular Fluid (ICF). b) Functions of water in maintaining bodily processes. 2. Imbalances and Homeostasis: a. Disorders of water metabolism. b. Mechanisms of fluid balance and homeostatic regulation	6	CO3
4	**MACRONUTRIENTS: CARBOHYDRATES, FATS, AND PROTEINS**	1. . Carbohydrates: a. Classification, composition, food sources, and functions. b. Storage mechanisms in the body. 2. Fats and Oils: a. Composition and classification: Saturated vs. unsaturated fatty acids. b. Food sources and functional roles of fats. 3. Proteins: a. Composition, food sources, and classification: Essential vs. non-essential amino acids.Functional significance and effects of protein deficiency.	6	CO4
5	**BIOCHEMICAL TESTS**	Key Diagnostic Tests: 1. Liver Function Tests (LFT): Overview and LFT profile. 2. Glucose Tolerance Test (GTT). 3. Renal Function Tests: Evaluation of the filtration barrier. 4. Total Protein and Albumin/Globulin Ratio (A-G Ratio): Importance and interpretation	6	CO5

Reference Books:

1. Tom Brody: Nutritional Biochemistry (Second Edition), Academic Press.
2. David A. Bender: Nutritional Biochemistry of the Vitamins, Second Edition,University College London,Cambridge university .
3. Harper's Illustrated Biochemistry, 29th edition, Mc Graw Hill Education, Lange
.4 Denise R. Ferrier, Richard A. Harvey, Biochemistry (Lippincott Illustrated Reviews Series), 6th edition

e-Learning Source:

1. https://www.nin.res.in/dietaryguidelines/pdfjs/locale/DGI07052024P.pdf
2. https://www.nin.res.in/downloads/DietaryGuidelinesforNINwebsite.pdf
3. https://www.icmr.gov.in/nutrition
4. https://www.who.int/publications/i/item/924154693X

	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.**
ND209	NUTRITIONAL BIOCHEMISTRY	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
		√	√	√	√		√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	ND210	Title of the Course	PRINCIPLE OF NUTRITION	L	T	P	C
Year	II	Semester	IV	3	1	0	4
Pre-Requisite	Nil	Co-requisite	Nil				
Course Objectives	The following syllabus has been developed . so that by the end of this course, students will have a comprehensive understanding of the principles of nutrition, energy metabolism, and the biochemical assessments related to overall health and wellness.						

Course Outcomes	
CO1	The student will learn and understand the basic concepts of nutrition, and nutritional values of foods, and Basal metabolicrate and measurement of energy requirements
CO2	The student will also learn and understand and the dietary requirement of carbohydrates, lipids and proteins and their biological significance.
CO3	The course will also aid to learn the nutritional requirement and significance of dietary minerals like calcium, phosphorus, magnesium, iron,iodine, zinc and copper and vitamins like vitamin B complex, C and A, D, E & K
CO4	The student will be learn about the Condition of malnutrition its prevention, and recommended dietary allowances
CO5	The student will be able to understand the concept of Obesity, Starvation and Protein metabolism in prolonged fasting

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**BASIC CONCEPTS**	Function of nutrients. Measurement of the fuel values of foods. Direct and indirect calorimetry. Basal metabolic rate: factors affecting BMR, measurement and calculation of BMR. Measurement of energy requirements	6	CO1
2	**ELEMENTS OF NUTRITION**	Dietary requirement of carbohydrates, lipids and proteins. Biological value of proteins. Concept of protein quality. Protein sparing action of carbohydrates and fats. Essential amino acids, essential fatty acids and their physiological functions.	6	CO2
3	**MINERALS**	Nutritional significance of dietary calcium, phosphorus, magnesium, iron, iodine, zinc and copper. Vitamins – Dietary sources, biochemical functions, requirements and deficiency diseases associated with vitamin B complex, C and A, D, E & K vitamins.	6	CO3
4	**MALNUTRITION**	Prevention of malnutrition, improvement of diets. Recommended dietary allowances, nutritive value of common foods. Protein-calorie malnutrition. Requirement of proteins and calories under different physiological states- infancy, childhood, adolescence, pregnancy, lactation and ageing	6	CO4
5	**OBESITY**	Definition, Genetic and environmental factors leading to obesity. Starvation: Techniques for the study of starvation. Protein metabolism in prolonged fasting.	6	CO5

Reference Books:

1. Tom Brody: Nutritional Biochemistry (Second Edition), Academic Press.
2. David A. Bender: Nutritional Biochemistry of the Vitamins, Second Edition,University College London,Cambridge university .
3. Harper's Illustrated Biochemistry, 29th edition, Mc Graw Hill Education, Lange
.4 Denise R. Ferrier, Richard A. Harvey, Biochemistry (Lippincott Illustrated Reviews Series), 6th edition

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	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.
ND210	**PRINCIPLE OF NUTRITION**	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment& Sustainability	Human Value	Professional Ethics	
		√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ND211**	**Title of the Course**	**FOOD ANALYSIS AND QUALITY CONTROL**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	3	1	0	4
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This subject aims to give students an understanding of laboratory testing which is important for the scientific analysis to identify problems with food products, to compliance with regulations, research and development of new products.						

Course Outcomes	
CO1	The students will develop the concept of proximate composition and different biochemical tests used to determine the proximate composition of food samples for various applications. Gain awareness about the basic principles and working of the instruments used for food analysis and quality control.
CO2	Students will develop understanding of the role of microbial agents in food industry and know the basic concepts of microbiological techniques that support their food handling and preservation skills.
CO3	Students will become acquainted about the sensory evaluation techniques, analysis of the data obtained
CO4	Student will learn about different modern analytical techniques to analysis the sample.
CO5	They will also understand different regulations and standards that need to be meet by the food product before reaching to the market.

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**PROXIMATE COMPOSITION**	Sampling, Moisture, Ash and mineral matter, Titrable acidity, Crude fat, Sugar, Crude protein, Crude fibre, Starch.	6	CO1
2	**FOOD ADULTRATION, FOOD FORTIFICATION, FOOD LAWS AND STANDARDS**	Food Adulteration, Types of food adulteration(Intentional Adulteration, Incidental Adulteration), Food Fortification, (Work, Benefits & example), Food Laws, Food Safety and standard Act, General Principles of food quality and safety.	6	CO2
3	**SENSORY EVALUATION**	Quality, Laboratory set-up and equipment, Panel selection, Judging quality, Paired comparison test, Duo-Trio test, Triangle test, Ranking test, Hedonic rating test.	6	CO3
4	**OBJECTIVE ANALYSIS**	UV-VIS molecular absorption spectrometry, atomic absorption spectrometry, HPLC, GC, Super critical fluid extraction, chromatography, Texture analysis, Colour	6	CO4
5	**QUALITY CONTROL AND NETWORK ANALYSIS**	FSSA 2006, BIS 1952, Agmark 1937, FPO 1955, PFA 1954, ISO 9000 series, ISO 22000, Codex Alimentarius, Total Quality Management, Hazard Analysis Critical Control Point, PERT and CPM network, Six sigma	6	CO5

Reference Books:

1. Pare, J. R. I. and Bélanger, !. M. R. (2015). Instrumental Methods ofFood Analysis: Elsevier
2. Pomeranz, Y. and Meloan, C. E. (1996). Food Analysis: Theory and Practice (3 ed.): CBS Publications, New Delhi.
3. Winton, A. L. (2001). Techniques ofFood Analysis: Agrobios, Jodhpur.
4. Sharma, B. K. (1994). Instrumental Methods of Chemical Analysis: Krishna, Meerut.

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	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.**
ND211	**FOOD ANALYSIS AND QUALITY**	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment& Sustainability	Human Value	Professional Ethics	
		√	√	√			√	√	**3,4**

Integral University, Lucknow

Course Code	ND212	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,8thed 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,6thedition,ElsevierPublications.

e-Learning Source:

1.https://youtu.be/t5DvF5OVr1Y

2.https://youtu.be/gggC9vctvBQ

3.https://youtu.be/ufvZ8bYtyO8

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	-	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.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
CV212	CLINICAL BIOCHEMISTRY	✓	✓	✓	✓		✓	✓	3,4

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ND213**	**Title of the Course**	**BASIC DIETETICS AND NUTRITIONAL ASSESSMENT**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	**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 Understand various methods and indices used for the assessment of nutritional status in different age groups.						

Course Outcomes	
CO1	Students will be able to understand the therapeutic diets.
CO2	Students will be able to understand about the diet nutrient and drug interaction.
CO3	Students will be able to understand about the diet in diseases of gastrointestinal and anemia.
CO4	Students will be able to learn about the methods and assessment of nutritional status.
CO5	Students will be able to understand the nutritional indices.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**THERAPEUTIC DIETS**	1. **Therapeutic Diets**: Basic Concept, Therapeutic Adaptation of Normal Diet, Factors Considered, Routine Hospital Diets, Mode of feeding methods, Role of dietitian in the Hospital and Community, Patient Care and Counseling. 2. **Diet in Weight Imbalance and Counseling:** Obesity and Underweight- Causes, Health risks, Dietary Treatment, Psychotherapy	6	CO1
2	**DIET, NUTRIENT AND DRUG INTERACTION**	1. **Diet, Nutrient and Drug Interaction:** Effect of drugs on ingestion, digestion, absorption and metabolism of nutrients. Effect of food, nutrients and nutritional status on drug dosage and efficacy. 2. **Diet in Fever:** Nutrition and Infection, Metabolic changes during Infection, Typhoid fever, Tuberculosis, HIV Infection and AIDS.	6	CO2
3	**DIET IN DISEASES OF GASTROINTESTINAL TRACT AND ANEMIA**	1. **Anemia**: Resulting from Acute Hemorrhage, Nutritional anemia, Sickle cell anemia, Thalassemia, Pathogenesis and dietary management in the above conditions Food Intolerances and Food Allergy: Adverse food reactions, Treatment and Management, Prevention. 2. **Diet in Diseases of Gastrointestinal Tract:** Upper GI Tract Disorders- Disorders of Esophagus, Disorders of Stomach. Lower GI Tract Disorders- Common Intestinal Disorders, Disorders of Small Intestine. Intestinal Brush Border Enzyme Deficiencies, Inflammatory Bowel Diseases, Disorders of Large Intestine	6	CO3
4	**METHOD AND ASSESSMENT OF NUTRITIONAL STATUS**	1. **Method and Assessment of Nutritional Status**, Identification of risk groups (random and purposive). Define Anthropometry. Requirement for measuring anthropometric data. Anthropometry and reference values for Newborn, Infant, Children, Adolescent, Adult and Elderly.	6	CO4
5	**NUTRITIONAL INDICES**	1. **Nutritional Indices:** Weight for Age, Height for Age, Weight for Height, BMI, BMI for Age, Mid arm circumference for age and height, Skin fold thickness, Head Circumference, Waist Hip Ratio: Various tools used, measurements, and Reference Range and Interpretations. Plotting and interpretation of growth charts for children below 5 years Identification of clinical signs of common nutritional disorders	6	CO5

Reference Books:

1. Raghuvanshi, R.S. and Mittal, M. (2014). Food Nutrition and Diet Therapy. Westvills Publication Delhi.
2. Agarwal, A and Udipi, S. (2014). Textbook of Human Nutrition. Jaypee Medical Publication Delhi.
3. Robinson. Basic Nutrition and Diet Therapy (8th Edition)
4. Mahan L. K., Escott- Stump, S. and Raymond J. L. (2012): "Krause's Food and the Nutrition Care Process", 13th Edition, Elsevier.
5. Ross, A.C., Caballero B., Cousins R. J., Tucker K.L. and Ziegler T. (2014) Modern Nutrition in Health and Disease. Wolters Kluwer Health/ Lippincott Williams and Wilkins. Ed 11th
6. Garrow, J. S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics. 10th Edition, Churchill Livingstone.
7. ICMR (2011) Dietary Guidelines for Indians – A Manual. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
8. World Health Organization (2006). WHO Child Growth Standards: Methods and development: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age.

e-Learning Source:

https://www.nin.res.in/dietaryguidelines/pdfjs/locale/DGI07052024P.pdf

https://www.nin.res.in/downloads/DietaryGuidelinesforNINwebsite.pdf

https://www.icmr.gov.in/nutrition

https://www.who.int/publications/i/item/924154693X

	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	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.
ND213	**BASIC DIETETICS AND NUTRITIONAL ASSESSMENT**	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment& Sustainability	Human Value	Professional Ethics	
		√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ND214**	**Title of the Course**	**NUTRITIONAL BIOCHEMISTRY LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	**2**	**1**	**0**	**3**
Pre-Requisite	10+2 with Biology	**Co-requisite**	**Nil**				
Course Objectives	Develop skills in biochemical analysis of carbohydrates, proteins, amino acids, urine, blood glucose, serum proteins, urea, creatinine, and minerals to assess physiological and pathological states..						

Course Outcomes	
CO1	Students will be able to understand and perform qualitative and quantitative tests to identify and estimate carbohydrates in biological samples.
CO2	Students will be able to Analyze normal and abnormal constituents of urine and interpret their clinical significanc.
CO3	Students will be able to understand about how to estimate blood glucose and identify amino acids and proteins for metabolic and nutritional assessment
CO4	Students will be able to understand about how to Evaluate serum protein, urea, and creatinine levels to assess metabolic and renal function
CO5	Students will be able to understand the Quantitatively estimate serum iron, phosphorus, and calcium to understand their role in health and disease

Unit No.	**Title of the Unit**	**Content of Unit**	**Contact Hrs.**	**Mapped CO**
1	**CARBOHYDRATES - IDENTIFICATION AND QUANTITATIVE ESTIMATION**	1. Identification of carbohydrates (qualitative tests). 2. Quantitative estimation of sugars (glucose, lactose, starch). 3. Estimation of glucose in urine by Benedict's method.	6	CO1
2	**URINE ANALYSIS**	1. Urine analysis: normal and abnormal constituents of urine. 2. Identification and clinical significance of abnormal findings in urine.	6	CO2
3	**BLOOD GLUCOSE AND PROTEINS**	1. Estimation of blood glucose. 2. Qualitative analysis of amino acids. 3. Qualitative analysis of proteins	6	CO3
4	**SERUM PROTEIN, UREA, AND CREATININE**	1. Estimation of serum proteins. 2. Estimation of serum creatinine. 3. Estimation of serum urea	6	CO4
5	**ESTIMATION OF SERUM MINERALS**	1. Estimation of serum iron. 2. Estimation of serum phosphorus. 3. Estimation of serum calcium.calcium	6	CO5

Reference Books:

1. Raghuvanshi, R.S. and Mittal, M. (2014). Food Nutrition and Diet Therapy. Westvills Publication Delhi.
2. Agarwal, A and Udipi, S. (2014). Textbook of Human Nutrition. Jaypee Medical Publication Delhi.
3. Robinson. Basic Nutrition and Diet Therapy (8th Edition)
4. Mahan L. K., Escott- Stump, S. and Raymond J. L. (2012): "Krause's Food and the Nutrition Care Process", 13th Edition, Elsevier.
5. Ross, A.C., Caballero B., Cousins R. J., Tucker K.L. and Ziegler T. (2014) Modern Nutrition in Health and Disease. Wolters Kluwer Health/ Lippincott Williams and Wilkins. Ed 11th
6. Garrow, J. S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics. 10th Edition, Churchill Livingstone.
7. ICMR (2011) Dietary Guidelines for Indians – A Manual. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
8. World Health Organization (2006). WHO Child Growth Standards: Methods and development: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age.

e-Learning Source:

https://www.nin.res.in/dietaryguidelines/pdfjs/locale/DGI07052024P.pdf
https://www.nin.res.in/downloads/DietaryGuidelinesforNINwebsite.pdf
https://www.icmr.gov.in/nutrition
https://www.who.int/publications/i/item/924154693X

	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	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.**
ND214	Nutritional 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	**ND215**	**Title of the Course**	**FOOD ANALYSIS AND QUALITY CONTROL LAB**	**L**	**T**	**P**	**C**
Year	**II**	**Semester**	**IV**	3	1	0	4
Pre-Requisite	**Nil**	**Co-requisite**	**Nil**				
Course Objectives	This subject aims to give students an understanding of laboratory testing which is important for the scientific analysis to identify problems with food products, to compliance with regulations, research and development of new products..						

Course Outcomes	
CO1	The students will learn the proximate analysis
CO2	The students will learn the sensory analysis of foods
CO3	The students will learn the microbial analysis of foods
CO4	The students will get acquainted with the various foods present in market

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	**PROXIMATE ANALYSIS**	1. Determination of moisture content of a given food sample 2. Determination of mineral content of a given food sample 3. Determination of Titrable acidity of a given food sample 4. Determination of crude fat of a given food sample 5. Determination of reducing and non-reducing sugar content of a given food sample 6. Determination of crude protein of a given food sample	6	CO1
2	**SENSORY ANALYSIS**	1. Determine the threshold value of any flavour 2. Duo-Trio test and Triangle test 3. Rate any food sample by using Hedonic rating test	6	CO2
3	**FOOD ADULTERATION**	1. Determination of food adulteration spices, grains and pulses.	6	CO3
4	**MARKET ANALYSIS**	1. Market analysis of various food as per governing standards	6	CO4

Reference Books:

1 S.S. Neilson, Food analysis, Springer.

2 AOAC methods for Food Analysis.

3 Y. Pomeranz and C. E Meloan, Food Analysis, Theory and practice; AVI Publishing Company, INC West Port, Connecticut, USA.

4 Fung, D.Y.C. and Matthews, R., Instrumental Methods for Quality Assurance in Foods; Marcel Dekker, Inc. New York.

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	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.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment& Sustainability	Human Value	Professional Ethics	
ND215	**FOOD ANALYSIS AND QUALITY CONTROL LAB**	√	√	√			√	√	**3,4**

Integral University, Lucknow

Effective from Session: 2024-25							
Course Code	**ND217**	**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 Diet Chart 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:**	ND217
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 Diet records	2	
6.	Diet 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 BND 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. Nutrition & Dietetics	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. Nutrition & Dietetics	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

BND- 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.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
ND217	**Clinical Posting**	√	√	√			√	√	**3,4,11**