

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	Course Title	Type of Paper		Period Poweek/se		1	Evaluation	Scheme		Sub.	Credit	Total
14.	code	Course Title	or raper	L	T	P	CT	TA	Total	ESE	Total	Credit	Credits
				,	THEOR	IES							
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
				P	PRACTI	CAL							
1	ND206	Nutritional Microbiology Lab	Core	0	0	4	40	20	60	40	100	0:0:2	2
2	ND207			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
To	tal			12	06	16	400	200	600	400	1000	26	26

S	Course		Туре			A	Attributes				United Nation Sustainable
N	Course	Course Title	of Paper	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	Development Goal (SDGs)
		THEORIES									
1	ND201	Food Processing and Preservation	Core	√	√	√	V		√	V	3,4
2	ND202	Nutritional Microbiology	Core	V	√	V	√		√	V	3,4
3	ND203	Medical Biochemistry-II	Core	V	√	V	√		√	V	3,4
4	ND204	Fundamental of Nutrition-II	Core	V	√	V	V		√	\checkmark	3,4
5	ND205	Introduction to Food Sciences	Core	V	√	√	√		√	√	3,4
6	ES101	Environmental Science	Core			V		√			3,4
		PRACTICAL									
1	ND206	Nutritional Microbiology Lab	Core	V	√	V	V		√	V	3,4
2	ND207	Medical Biochemistry -II lab	Core	V	√	V	V		V	V	3,4
3	ND208	Fundamental of Nutrition-II lab	Core	V	√	√	V		√	√	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)



Course	e Code	ND201	Title of the Course	FOOD PROCESSING & PRESERVATION	L T	P C
Year		II	Semester	Ш	2 1	0 3
Pre-Re	equisite	10+2 with Biology	Co-requisite	Nil		
Course	e Objectives	faced by 2. Design/o	the humans	dge of nutrition and dietetics, relate to scientific issues so as to preve velop innovative food products or substitutes or alternate solutions to and society at large.		
				Course Outcomes		
CO1	Students will be abl	le to understan	d the history and importa	nce of food processing and preservation.		
CO2	Students will be abl	le to understan	d about the common food	l additives.		
CO3	Students will be abl	e to understan	d about the methods of pr	reservation.		
CO4	Students will be abl	e to about the	definition, role and remed	dial measures regarding food spoilage.		
CO5	Students will be abl	e to understan	d about the preserved foo	od.		
Unit No.	Title of the U	nit		Content of Unit	Contact Hrs.	Mapped CO
1	PRESERVAT	TION	 Methods of low and l Dehydration – Types in the dehydration prodehydrated foods. 	, objectives, and principles of dehydration, steps involved ocess, merits and demerits- effects on nutritional value in	6	CO1
2	FOOD ADDIT	TIVES			6	CO2
3	PRESERVATION	TEXADEC	Pickling, Salting, Sm	dration-types of dehydration (Sun drying, spray drying) oking, Freezing – slow and quick, merits and demerits. ng steps involved in canning, Irradiation, and microwave	6	CO3
4	FOOD SPOIL	AGE	causes of spoilage, perishable and non-p 2. Anaerobic and aerob fungi, bacteria. 3. Remedial measures to	ic microorganisms involved in food preservation - mold,	6	CO4
5	PRESERVED	FOODS	 Products using sugar Products using salt - 1 Preservation using vir 	- squash, jam, jelly tomato ketchup, pickles, chutneys.	6	CO5

Reference Books:

Effective from Session: 2024-25

- 1. Swaminathan (1995): "Food & Nutrition", The Bangalore Printing & publishing colltd., 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.
- 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.

-Learning Source:

- https://youtu.be/blqShM0vR6s?si=jNIMswiY5NN9GW -
- https://youtu.be/2PgVWLjK0gE?si=ljwTU4RiyM-b1Qda https://youtu.be/DNDipuD1Y9c?si=5D7oqq71sxah7aMx

						Cou	rse Art	iculatio	n Matr	rix: (Ma _l	ping of	COs witl	POs and	dPSOs)				
PO- PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO4	PSO5	PSO6	PSO7
CO																		
CO1	1	3	1	2	-	-	-	1	2	-	-	2	-	1	-	1	-	1
CO2	1	3	1	3	-	ı	-	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			Att	tributes				SDGs
ND201	FOOD PROCESSING &	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
	PRESERVATION	√	√	√			V	V	3,4



Effective from Session:2	023-24											
Course Code	ND202	Title of the Course	NUTRITIONAL MICROBIOLOGY	L	T	P	C					
Year	II	Semester	Ш	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 attritional 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		Importance and significance of Microorganisms in food science. Factors affecting the growth of micro-organisms in food – Intrinsic and Extrinsic parameters	6	CO1
2	MICROORGANISMS	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	PRESERVATION OF	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		Bacterial food-borne diseases, Mycotoxins: Aflatoxicosis, Deoxy- nivalenol Mycotoxicosis, Ergotism, Food Borne Animal Parasites Protozoa, Food Borne Viral Pathogens.	6	CO5

Reference Books:

- Prescott LM Harley JP and Klein DA (2006). Microbiology (7th edition) McGraw Hill, New York.
 Frazier, W.C. (1988) Food Microbiology, Mc Graw Hill Inc. 4th Edition.
 Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication
 Yasmine Motarjemi and Martin Adams. (2006) Emerging Foodborne pathogen- Wood Head Publishing England.
 Arun, K Bhunia. (2008) Foodborne microbial pathogens: Mechanisms and pathogenesis. Springer.
 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/ https://www.healthline.com/health/what-is-antiseptic
 3. https://www.healthline.com/health/what-is-antiseptic

						Cour	se Articu	lation M	Iatrix: (N	Mapping o	of Cos wit	h Pos and l	PSOs)				
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1503	1504	1503
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

						Co	urse Ar	ticulatio	n Matri	x: (Mappi	ng of COs	s with POs	s and PSO	s)				
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO	FOI	FO2	103	FO4	FO3	100	FO/	100	FO9	FOIU	FOII	FO12	1301	F3O2	F3O3	F304	1303	1300
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 Correla	tion: 2- Mod	erate Correlati	ion: 3- Subsi	tantial Co	orrelation Attr	ibutes & SI)Gs	
Course Code	Course Title	,		A	ttributes				SDGs
ND202	NUTRITIONAL	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
	MICROBIOLOGY	V	V	√	V		√	√	3,4



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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 of Biochemistry		metabolism, metabolic disorders, laboratory test and ins	trument	s of C	inical	

	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	 Acid-Base balance and pH: pH and its Regulation, Metabolic and Respiratory Disorders. Principle, application, calibration and maintenance of colorimeter, Blood Chemistry analyzer, ABG analyzer, Flame photometer, Turbidimetry, Nephelometry. 	6	CO5

- 1. D M Vasudevan, Text book of Medical Biochemistry, Jaypee Publishers.
- 2. M N Chatterjee&RanaShinde, Text book of Medical Biochemistry, Jayppe Publications.
- 3. Michael Cox, David L. Nelson, Lehninger Principles of Biochemistry, 7thedition, W.H. Freeman.
- 4. RanjanaChawla, Practical Clinical Biochemistry: Methods and Interpretations.

e-Learning Source:

- 1.https://youtu.be/t5DvF5OVr1Y
- 2. https://youtu.be/gggC9vctvBQ
- https://youtu.be/ufvZ8bYtyO8
 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								
ND203	MEDICAL BIOCHEMISTRY-II	Employability	Entrepreneursh ip	Skill Developme nt	Gender Equalit y	Environment & Sustainability	Huma n Value	Professional Ethics	No.		
		$\sqrt{}$	$\sqrt{}$	\checkmark			$\sqrt{}$	$\sqrt{}$	3,4		



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Effective from S	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											
Course Objectives	advances in food metabolites and I food is the med	d technology. This course numan health. Moreover, the licine). The knowledge of	Nutrition" aims at developing basic understanding about nutrition, its effect on hur e encompasses physiological, biochemical and social aspects of food and discusse he course is focused on the advances in the most emerging area of applied science of N of nutrition under extreme climate conditions, space nutrition, and sports nutrition werful tool for physical, mental, and social wellbeing.	s relati Jutrace	ionshi uticals	p bet s (who	tween ere					

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

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

e-Learning Source:

- $\frac{https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt}{https://www.ucsfhealth.org/medical-tests/semen-analysis#:\sim:text=Semen\%20analysis\%20is\%20one\%20of,have\%20a\%20male\%20infertility\%20.}$

		Course Articulation Matrix: (Mapping of Cos with Pos and PSOs)															
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO	101	102	103	101	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1501	1505
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	1	-	3	3	2	1	1	2	3	1	-	-	-	1
CO5	2	-	-	2	-	3	2	2	1		2	2	-	-	-		1

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

Course Code	Course Title		Attributes									
ND204	FUNDAMENTALS OF	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment& Sustainability	Human Value	Professional Ethics	No.			
	NUTRITION-II	√	1	√			V	V	3,4			



Effective from Session: 2024-25										
Course Code	ND205	Title of the Course	INTRODUCTION TO FOOD SCIENCE	L	T	P	C			
Year	II	Semester	Ш	2 1 0 3						
Pre-Requisite	Nil									
Course Objectives	advances in fo metabolites and food is the me	ood technology. This course enco d human health. Moreover, the co edicine). The knowledge of nutr	ion" aims at developing basic understanding about nutrition, its e ompasses physiological, biochemical and social aspects of food a burse is focused on the advances in the most emerging area of applie rition under extreme climate conditions, space nutrition, and specific tool for physical, mental, and social well-being.	nd disc d scien	usses re	elationsh utraceuti	ip between cals (where			

	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.
- Srilakshmi (1997): "Food Science", New Age International (P) Ltd, Publishers, Pune.
- 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.
- 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
- 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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO	101	102	103	101	103	100	107	100	10)	1010	1011	1012	1501	1502	1503	1501	1505
CO1	1	3	2	2	-	-	-	1	2	1	-	2	2	1	-	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-Lov	v Correlation: 2	<u> 2- Moderate Corre</u>	elation: 3- Subs	tantial Corr	elation Attribut	tes & SDC	is			
Course Code	Course Title	,	Attributes								
ND205	INTRODUCTION TO FOOD SCIENCES	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Huma n Value	Professional Ethics	No.		
		√	V	√	$\sqrt{}$		√	V	3,4		



Effective from Session: 2	Effective from Session: 2024-25											
Course Code	rse Code ES101 Title of the Course ENVIRONMENTAL STUDIES L											
Year	II	Semester	Ш	2	1	0	3					
Pre-Requisite	Nil	Nil Co-requisite Nil										
Course Objectives	The student will be made aware of our environment in general natural resources, ecosystems, environmental pollution											

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

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

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

e-Learning Source:

- https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-I 15.pdf https://juniperpublishers.com/rapsci/pdf/RAPSCI.MS.ID.555586.pdf 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

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



Integral	University,	Lucknow
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Effective from	Sessio	n: 2024-25									
Course Code		ND206	ND206 Title of the Course NUTRITIONAL MICROBIOLOGY LAB								
Year		П	Semester	III	0	0	4	2			
Pre-Requisite		Nil	Co-requisite	Nil							
Course Objecti	ves		Students learn to integrate science with day to day life, nutrition, quality control and laws governing the food safety.								
		 Can become independ 	lent researchers and make 1mpa	ctful 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	Demonstration of Microscope and its parts.		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.	60	CO3
10	SPORE STAINING	10. Staining of bacterial spores.]	CO4
11	MICROSCOPY	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

- Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication. 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 .	Articul	ation M	Iatrix: (Mapping	g of COs	with PO	s and PS	Os)			
PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1504	1505
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

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Course Code	Course Title		Attributes									
ND206	NUTRITIONAL MICROBIOLOGY LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.			
	MICKOBIOLOGI LAB	√	√	√	√		√	√	3,4			



Effective from Session: 2024	1-25	_								
Course Code	ND207	Title of the Course	MEDICAL BIOCHEMISTRY-II LAB	L	T	P	C			
Year	II	Semester	III 0 0 4							
Pre-Requisite	Nil	Co-requisite	Nil							
Course Objectives	This course d	nis 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.	Estimation of Serum Creatinine by Alkaline Picrate method.		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.	60	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

- 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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO	101	102	103	104	103	100	107	100	10)	1010	1011	1012	1501	1502	1505	1504	1505
CO1	1	3	2	2	-	-	1	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			At	tributes				SDGs
ND207	MEDICAL BIOCHEMISTRY-II LAB	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.
		√	√	√	√		√	√	3,4



Effective from Session: 2024	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	human health aspects of foo advances in t nutrition und	n and newer advances in odand discusses relation he most emerging area er extreme climate cond	and Nutrition" aims at developing basic understanding about food technology. This course encompasses physiological aship between metabolites and human health. Moreover, the of applied science of Nutraceuticals (where food is the meditions, space nutrition, and sports nutrition empowers stude physical, mental, and social wellbeing.	, biocl cours icine).	hemical e is foc The kr	l and s used o lowled	ocial n the ge of							

	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 1110
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	 Demonstration and uses Food amid Weight and Measures 		CO1,CO2
2	FOOD RECREATION	 Snacks Main Course Beverages 		CO3
3	FOOD PREPARATION	 Snacks Main Course Beverages 	60	CO4
4	NUTRITIONEDUCATION	1. Pamphlets 2. PEM 3. Anemia		CO5

Reference Books:

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

e-Learning Source:

- https://www.slideshare.net/peddanasunilkumar/introduction-to-pathology-ppt
- $\underline{\text{https://www.ucsfhealth.org/medical-tests/semen-analysis\#:} \sim : \text{text=Semen\%20} \text{analysis\%20} : \text{s\%20} \text{one\%20} \text{of,have\%20} = \text{s\%20} : \text{s\%20} = \text{s\%20} : \text{s\%20} = \text{s\%20} : \text{s\%20} : \text{s\%20} = \text{s\%20} : \text{s\%20} :$
- https://www.youtube.com/watch?v=wZCKrseSIOE

		Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	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			At	tributes				SDGs	
ND208	FUNDAMENTAL OF	Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	No.	
	NUTRITION-II-LAB	√	√	√	√		√	√	3,4	