Choice Based Credit System

Scheme & Syllabus of

Bachelor of Science (Hons) in Nutrition and Dietetics

B.Sc. (Hons)Nutrition and Dietetics

Batch 2025 onwards

By

Board of Study Food Science and Engineering

Department of Academics

I.K. Gujral Punjab Technical University

Vision:

To become a center of excellence in nutrition and dietetics education, fostering scientific innovation, ethical practice, and community well-being through transformative learning and evidence-based dietary science.

Mission:

- To provide a robust academic foundation in nutritional sciences, food technology, and health promotion.
- To nurture professionals with ethical integrity, communication skills, and research aptitude for effective dietetic practice.
- To promote community engagement and public health through culturally relevant and sustainable nutritional interventions.
- To foster lifelong learning and interdisciplinary collaborations that address national and global health challenges.

Program Name:	Bachelor of Science (Hons) in Nutrition and Dietetics **Or** B.Sc. (Hons) in Nutrition and Dietetics
Program Level	Undergraduate (UG) Programme
Duration	4 years (8 Semesters)
Eligibility for Admission	A Candidate who has passed 10+2 or equivalent with Physics, Chemistry and Mathematics/Biology/ Agriculture/Home Science with at least 50% marks in aggregate.
Year of Implementation	New Syllabus will be implemented from 2025 onwards.
Medium of Instruction	English

Program Education Objectives:

- **PEO1** **Scientific Competence and Application:** Graduates will acquire a robust foundation in human nutrition, physiology, biochemistry, and food science, enabling them to assess nutritional status and apply scientific principles to individual and community health.
- **PEO2** **Professional Skills, Ethics, and Communication:** Graduates will demonstrate ethical conduct, effective communication, and client-centered counseling skills required in clinical, food industry, public health, and wellness settings.
- **PEO3** **Research Orientation and Lifelong Learning**: Graduates will engage in research-based thinking, critical analysis, and evidence-based decision-making, while continuously upgrading knowledge to meet global nutrition and health trends.
- **PEO4** **Public Health Impact and Societal Engagement:** Graduates will contribute to nutrition advocacy, community outreach, and sustainable health solutions that improve nutritional outcomes at local and national levels.

Program Outcomes:

- **PO1** **Core Nutritional Knowledge and Integration:** Apply foundational knowledge in nutrition, biochemistry, physiology, and food science to assess dietary needs and implement nutritional solutions for individuals and populations.
- **PO2** **Ethical Practice and Communication:** Demonstrate empathy, professional ethics, and effective communication while working with diverse populations in healthcare, research, and wellness sectors.
- **PO3** **Scientific Inquiry and Critical Thinking:** Critically analyze nutritional data, engage in research, and apply evidence-based approaches to solve real-world health and dietetic challenges.
- **PO4** **Technological Adaptation and Sustainability:** Utilize digital tools, food analysis software, and sustainable nutrition practices in food service operations, public health, and industry-based settings.
- **PO5** **Lifelong Learning and Community Health Engagement:** Commit to continuous professional growth and actively participate in health education, nutrition policy, and public health programs to serve society.

Mapping of Program Outcomes with Program Education Objectives: - Formulation of Program Outcomes with Program Education Objectives matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

POE / PO	POE1	POE2	POE3	POE4
PO1	**3**	**3**	**2**	**3**
PO2	**3**	**3**	**3**	**2**
PO3	**2**	**3**	**3**	**3**
PO4	**3**	**2**	**3**	**3**
PO5	**3**	**3**	**3**	**3**

Program Scheme & Syllabus

Semester I

Course Code	Course Title	Load			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BSND111-25	Principles of Human Nutrition	3	1	0	40	60	100	4
BSND112-25	Introduction to Food Science	3	1	0	40	60	100	4
BSND113-25	Food Microbiology & Food Safety	3	1	0	40	60	100	4
BSND114-25	Human Physiology	3	1	0	40	60	100	4
BSND115-25	Principles of Human Nutrition (Lab)	0	0	2	30	20	50	1
BSND116-25	Introduction to Food Science (Lab)	0	0	2	30	20	50	1
BSND117-25	Food Microbiology & Food Safety (lab)	0	0	2	30	20	50	1
BSND118-25	Human Physiology (lab)	0	0	2	30	20	50	1
HVPE101-18	Human Values, De-addiction, and Traffic Rules	3	0	0	40	60	100	3
HVPE102-18	Human Values, De-addiction and Traffic Rules (Lab/Seminar)	0	0	1	25[#]	--	25	1
BTHU103-18	English	1	0	0	40	60	100	1
BTHU104-18	English (Lab)	0	0	2	30	20	50	1
BMPD101-18	Mentoring and Professional Development	0	0	1	25[#]	--	25	1
	Total	16	4	**13**	440	460	900	27

[#] The Human Values, De-addiction and Traffic Rules (Lab/ Seminar), and Mentoring and Professional Development course will have internal evaluation only.

SEMESTER- I

BSND111-25: PRINCIPLES OF HUMAN NUTRITION

Total Marks: 100

L	T	P
3	1	0

Course objective:

To provide students with a comprehensive understanding of human nutrition, including the functions, metabolism, sources, and deficiencies of essential nutrients, and the application of nutritional science in promoting health and preventing malnutrition.

Course outcome: At the end of the course, the students will be able to

CO1	Understand the fundamental concepts of human nutrition, including the role of food groups, malnutrition, and nutritional status assessment methods.
CO2	Develop knowledge of the metabolism, functions, sources, and deficiencies of water, energy, carbohydrates, proteins, and fats in human nutrition.
CO3	Gain proficiency in the formulation of Recommended Dietary Allowances (RDA) and dietary guidelines, emphasizing the concept of a balanced diet for optimal health.
CO4	Analyze the role of vitamins and minerals in maintaining human health, and recognize their deficiency symptoms and metabolic processes.
CO5	Apply nutritional education principles and understand the scope of nutrition policies, including the use of non-conventional foods for improving public health.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	1	2
CO2	3	2	3	2	2
CO3	3	2	2	2	3
CO4	3	1	2	2	2
CO5	2	3	3	3	3

Details of the Course Content - BSND111-25: PRINCIPLES OF HUMAN NUTRITION

Unit	Contents	Contact Hours
I	**Introduction to Human Nutrition** • **Concept of Nutrition**: Definition and key terms associated with nutrition. Overview of food groups and their respective functions, including energy-providing, body-building, protective, and regulatory roles. • **History and Scope of Nutrition**: A brief history of nutritional science and its expanding scope. • **Malnutrition and Health**: Types of malnutrition, Understanding the impact of malnutrition on human health, along with methods to assess nutritional status, such as dietary surveys, anthropometry, clinical signs, and biochemical methods. • **Balanced Diet and Nutritional Requirements**: Introduction to the concept of a balanced diet and minimal nutritional requirements. Exploration of Recommended Dietary Allowances (RDA) and the formulation of dietary guidelines. • **Nutritional Education and Policies**: Overview of nutrition education, policies, and their implementation in public health. The role of non-conventional foods in nutrition. • **Water**: Functions, metabolism, sources, and deficiency symptoms related to water.	12
II	**Energy, Carbohydrates, and Fat Metabolism** • **Energy**: Detailed understanding of the functions, metabolism, sources, and deficiency of energy in the human body. • **Carbohydrates**: Exploration of the functions, metabolism, sources, and deficiency symptoms associated with carbohydrates.	12
III	**Proteins and Fats** • **Proteins**: Functions, metabolism, sources, and deficiencies related to proteins, focusing on their role in growth, repair, and other bodily functions. • **Fats**: Detailed analysis of the functions, metabolism, sources, and deficiency of fats.	12
IV	**Vitamins and Minerals** • **Vitamins**: Examination of the functions, metabolism, sources, and deficiencies of vitamins. • **Minerals**: Functions, metabolism, sources, and deficiency symptoms of essential minerals, with emphasis on their role in maintaining physiological balance.	12

Recommended Books and Resources

1. Gropper, S. S., & Smith, J. L. (2012). *Advanced Nutrition and Human Metabolism* (6th ed.). Wadsworth, Cengage Learning.
2. Sundarapandian, V., & Perumal, S. (2019). *Human Nutrition and Dietetics* (3rd ed.). CRC Press.

3. Mahan, L. K., & Escott-Stump, S. (2017). *Krause's Food & the Nutrition Care Process* (14th ed.). Elsevier.
4. Joshi, S. A. (1992). *Nutrition and Dietetics.* Tata McGraw-Hill Publishing Company Ltd.
5. Srilakshmi, B. (2008). *Nutrition Science* (5th ed.). New Age International (P) Ltd.
6. Passmore, R., & Eastwood, M. A. (1986). *Human Nutrition and Dietetics* (8th ed.). English Language Book Society/Churchill Livingstone.
7. Bender, D. A. (2002). *Nutritional Biochemistry and Metabolism* (2nd ed.). Springer.
8. Shils, M. E., Shike, M., Ross, A. C., Caballero, B., & Cousins, R. J. (2013). *Modern Nutrition in Health and Disease* (11th ed.). Lippincott Williams & Wilkins.
9. Aroda, V. R. (2015). *Nutrition and Health* (2nd ed.). Wiley.
10. Harrison, G. G., & Haines, P. S. (2016). *Nutritional Assessment* (3rd ed.). Oxford University Press.
11. Chopra, S., & Meindel, P. (2002). *Supply Chain Management: Strategy, Planning and Operation*. Prentice Hall.
12. Handfield, R. B., & Nichols, E. L. (1999). *Introduction to Supply Chain Management*. Prentice Hall.
13. Hopp, W. J., & Spearman, M. L. (1996). *Factory Physics: Foundations of Manufacturing Management*. McGraw Hill.
14. Levi, D. S., Kaminsky, P., & Levi, E. S. (2000). *Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies*. McGraw Hill.
15. Shapiro, J. F. (2001). *Modeling the Supply Chain*. Duxbury Thomson Learning.
16. Tayur, S., Ganeshan, R., & Magazine, M. (1999). *Quantitative Models for Supply Chain Management*. Kluwer Academic Publishers.
17. Viswanadham, N. (2000). *Analysis of Manufacturing Enterprises*. Kluwer.
18. Viswanadham, N., & Narahari, Y. (1998). *Performance Modeling of Automated Manufacturing Systems*. Prentice Hall.
19. Joshi, S. A. (1992). *Nutrition and Dietetics.* Tata McGraw-Hill Publishing Company Ltd.
20. Srilakshmi, B. (2008). *Nutrition Science* (5th ed.). New Age International (P) Ltd.
21. Passmore, R., & Eastwood, M. A. (1986). *Human Nutrition and Dietetics* (8th ed.). English Language Book Society/Churchill Livingstone.

BSND112-25: INTRODUCTION TO FOOD SCIENCE

Total Marks: 100

L	**T**	**P**
3	1	0

Course objective:

Introduce students to the fundamentals of food science, including its historical development and composition, structure, and nutritional value of foods derived from plants and animals.

Course outcome: At the end of the course, the students will be able to

CO1	Explain the basics of food science and technology, and the status of the food industry in India and globally.
CO2	Analyze the functions and changes of nutrients during food processing and storage.
CO3	Describe the properties of water and its impact on food quality and spoilage.
CO4	Evaluate the composition, nutritional value, and processing techniques of plant-based foods.
CO5	Assess the composition, nutritional value, and processing effects on animal-based foods and understand the concept of healthy foods.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2	2	3	2
CO2	3	2	3	3	2
CO3	2	1	2	3	2
CO4	3	2	2	3	2
CO5	3	2	3	3	2

Details of the Course Content - BSND112-25: Introduction To Food Science

Unit	Contents	Contact Hours
I	**Introduction to Food Science and Fundamentals** **1. Introduction to Food Science, Food Technology, and Food Engineering:** Overview of food science, its importance, and interdisciplinary nature; Distinctions and interrelationships between food science, food technology, and food engineering **2. Introduction to Foods:** Definition, functions, food groups, classification of foods. Study of different cooking methods, merits and demerits, Solar cooking, Microwave cooking. Changes in nutrients during processing and storage of food. **3. Physical Properties of Water and Ice:** Chemical nature and structure of the water molecule; Physical properties of water and ice; Absorption phenomena and types of water solutions; Colligative properties of water; Distinction between free and bound water; Water activity and its role in food spoilage; Freezing and ice structure: Impact on food preservation and quality	12
II	**Food Dispersions and Plant-Based Foods** **1. Food Dispersions:** Introduction to food dispersions; Structure and classification of different types of food dispersions (e.g., solutions, suspensions, emulsions, gels); Stability factors and mechanisms affecting food dispersions **2. Cereals and Millets:** Definition, types, composition, nutritional value, structure (Wheat and rice), factors affecting and changes in major cereals and millets during processing (cooking and germination), use in variety of preparation: selection, variety, storage, nutritional aspects and cost. **3. Pulses:** Definition, types, composition, nutritional value, factors affecting and changes in major pulses during processing (Soaking, Germination, Decortication, Cooking, Fermentation); Identification and implications of antinutritional factors in pulses.	11
III	**Composition and Nutritive Value of Plant-Based Foods** 1. **Nuts & Oilseeds:** Definition, types, composition, and nutritional value of nuts and oilseeds; Processing techniques for oilseeds such as soybeans and coconut; Production and applications of protein isolates and texturized vegetable protein (TVP) 2. **Fruits & Vegetables:** Definition, classification, composition, and nutritional value of fruits and vegetables; Vegetable cookery: Techniques and nutritional implications; Changes in fruits and vegetables during maturation, ripening, storage, and cooking; Concept and mechanisms of enzymatic browning in fruits and vegetables 3. **Spices & Herbs:** Definition, classification, composition, and nutritional value of spices and herbs; Major medicinal plants, Culinary and preservative uses of spices and herbs; Overview of essential oils and oleoresins: Extraction, properties, and applications.	11
IV	**Composition and Nutritive Value of Animal-Based Foods and Health Foods** 1. **Eggs:** Structure, composition and nutritional value of eggs; Grading and quality assessment of egg; Changes in eggs during cooking and storage 2. **Meat & Fish:** Structure, types, composition and nutritional value of meat and fish; Different processing methods and their effects on meat and fish quality and nutritional value	14

	3. **Dairy Products:** Definition, types, composition, nutritional value of milk; Overview of different types of market milk and milk products; Changes during milk processing such as pasteurization and homogenization; Storage and its effects on milk and milk products 4. **Health Foods:** Functional foods and nutraceuticals; definition, classification and their role in health; Organic foods: Definition and advantages; Genetically modified (GM) foods: Concept and Implications.	

Recommended Books and Resources

1. Potter, N. N., & Hotchkiss, J. H. (1998). *Food science* (5th ed.). Springer.
2. DeMan, J. M. (2014). *Principles of food chemistry* (4th ed.). Springer.
3. Manay, N. S., & Shadaksharaswamy, M. (2009). *Food facts and principles*. New Age International.
4. Srilakshmi, B. (2016). *Food science* (4th ed.). New Age International.
5. Frazier, W. C., & Westhoff, D. C. (2008). *Food microbiology* (5th ed.). Tata McGraw-Hill Education.
6. Fellows, P. J. (2017). *Food processing technology: Principles and practice* (4th ed.). Woodhead Publishing.
7. De, S. (2015). *Outlines of dairy technology* (3rd ed.). Oxford University Press.
8. Vaclavik, V. A., & Christian, E. W. (2014). *Essentials of food science* (4th ed.). Springer.
9. Mudambi, S. R., & Rao, S. M. (2007). *Food science*. Oxford University Press
10. Singh, R. P., & Heldman, D. R. (2014). *Food engineering: Fundamentals and applications* (2nd ed.).
11. Sharma, D. (2018). *The food industry in India: Challenges and opportunities*.
12. Whitney, E. N., & Rolfes, S. R. (2018). *Understanding nutrition* (15th ed.).
13. McCain, V. B. (2010). *Water in foods*.
14. Walstra, P. (2003). *Physical chemistry of foods*.
15. Fennema, O. R. (Ed.). (1996). *Food chemistry* (3rd ed.).
16. deMan, J. M. (1999). *Principles of food chemistry* (3rd ed.). Springer.
17. Grumezescu, A. M., & Holban, A. M. (Eds.). (2019). *Handbook of plant-based food and beverage technology*.
18. Li, T. S. C. (2006). *Vegetables and fruits: Nutritional and therapeutic values*.
19. Walstra, P., Wouters, J. T. M., & Geurts, T. J. (2006). *Dairy science and technology* (2nd ed.).
20. Warriss, P. D. (2010). *Meat science: An introductory text* (2nd ed.).
21. Garg, M. L., & Berry Ottaway, P. (Eds.). (2011). *Functional foods: Principles and technology*.
22. Hui, Y. H. (Ed.). (2006). *Handbook of food science, technology, and engineering* (Vols. 1-4).
23. Brennan, J. G. (Ed.). (2006). *Food processing handbook*.
24. Hui, Y. H., Meunier-Goddik, L., Josephsen, J., Nip, W.-K., Stanfield, P. S., & Lam, A. S. T. (Eds.). (2004). *Handbook of food and beverage fermentation technology*.
25. Shortt, C., & O'Brien, J. (Eds.). (2004). *Handbook of functional dairy products*.
26. Shetty, K., Paliyath, G., Pometto, A., & Levin, R. E. (2008). *Food biotechnology* (2nd ed.). CRC Press.
27. Bagchi, D., Misra, L. K., Bagchi, M., & Kothari, S. C. (Eds.). (2014). *Nutraceutical and functional food processing technology* (2nd ed.). CRC Press.

BSND113-25: FOOD MICROBIOLOGY & FOOD SAFETY

Total Marks: 100	**L**	**T**	**P**
	3	1	0

Course objective:

To enable students to understand the role of microorganisms in food systems, their impact on food safety, spoilage, preservation, and fermentation, and to apply national and international food safety standards for ensuring hygienic food production and public health protection.

Course outcome: At the end of the course, the students will be able to

CO1	Explain the fundamentals of food microbiology, including classification, structure, and growth behavior of foodborne microorganisms.
CO2	Identify sources of microbial contamination, spoilage patterns, and preventive hygiene practices in various food commodities.
CO3	Analyze the role of microorganisms in food fermentations and recognize microbial agents involved in traditional and industrial processes.
CO4	Evaluate the causes, symptoms, and control measures of foodborne diseases and apply principles of food preservation technologies.
CO5	Apply national and international food safety frameworks (HACCP, ISO, FSSAI) and sanitation standards to ensure safe food handling and processing.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2	2	2	2
CO2	3	2	3	2	2
CO3	3	2	3	2	2
CO4	3	2	3	3	2
CO5	3	3	3	3	3

Details of the Course Content - BSND113-25: FOOD MICROBIOLOGY & FOOD SAFETY

Unit	Contents	Contact Hours
I	**Introduction to Food Microbiology**: History and Development of Food Microbiology, Definition and Scope of food microbiology **Types of Microorganisms in Food:** Classification and Nomenclature, Morphology and Structure Importance in food (bacteria, fungi and viruses), Significance of spores **Microbial Growth in Food:** Microbial growth phases and nutritional requirements; Intrinsic and Extrinsic factors influencing microbial growth. **Microbial Food Spoilage:** Sources and types of microbial contamination in foods: Fresh produce (vegetables, fruits), Cereals, pulses, oilseeds, Dairy and meat products; Hygiene and handling practices to prevent spoilage.	12
II	**Food Fermentations:** Fermentation –definition and types, Microorganisms used in food fermentations, Fermented Foods-types, methods of manufacture for vinegar, sauerkraut, yoghurt , soya sauce, wine and traditional Indian foods. **Food borne Diseases:** Food poisoning and microbial toxins, types of food poisonings; Foodborne illnesses: types, origin, symptoms, and prevention; Bacterial pathogens associated with food poisoning (e.g., *Salmonella*, *Listeria*, *E. coli*, *Clostridium Botulism, Clostridium perfringens gastroenteritis, Shigella, Staphylococcus food intoxication, Typhoid (Salmonella Typhi)*); Non-bacterial causes of foodborne diseases: Toxic algae and mycotoxins from fungi, Viral pathogens (e.g., Norovirus, Hepatitis A); Other Foodborne Infections: Arizona fever	11
III	**Principles and techniques of food preservation:**Thermal processing (pasteurization, sterilization), Cold chain management and low-temperature storage, Radiation methods (ionizing and non-ionizing), Use of chemical preservatives and natural antimicrobials, High-pressure processing (HPP); Control of water activity (aw). Introduction to Hurdle Technology **Enumeration techniques & control of microorganisms in foods:** Qualitative and quantitative methods-conventional as well as rapid. **Introduction to Food Safety**: Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety	11
IV	**Food Safety Management Tools:** Basic concept, Prerequisites (GHP, GMP), HACCP, ISO series, TQM, FSSAI and Risk Analysis. **Hygiene and Sanitation in Food Service Establishments**: Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene.	14

Recommended Books and Resources

1. Frazier, W. C., & Westhoff, D. C. (2015). Food Microbiology (5th ed.). Tata McGraw Hill Publication, New Delhi.
2. Adams, M. R., & Moss, M. O. (2016). Food Microbiology (4th ed.). Royal Society of Chemistry, Cambridge.
3. James, M. J., Loessner, M. J., & Golden, D. A. (2018). Modern Food Microbiology (8th ed.). Springer.
4. Stanier, R. Y. (2006). General Microbiology (5th ed.). MacMillan, Hampshire.
5. Creager, J. G., Black, J. G., & Davison, V. E. (1990). Microbiology: Principles & Applications. Prentice Hall, New Jersey.

6. Battcock, M., & Azam-Ali, S. (1998). Fermented Fruits and Vegetables: A Global Perspective. FAO Agricultural Services Bulletin No. 134.
7. Campbell-Platt, G. (2017). Fermented Foods of the World: A Dictionary and Guide. Butterworth-Heinemann.
8. Doyle, M. P., & Beuchat, L. R. (2019). Food Microbiology: Fundamentals and Frontiers (4th ed.). ASM Press.
9. Fellows, P. J. (2017). Food Processing Technology: Principles and Practice (4th ed.). Woodhead Publishing.
10. Forsythe, S. J. (2010). The Microbiology of Safe Food (2nd ed.). Wiley-Blackwell.
11. Leistner, L., & Gorris, L. G. M. (1995). Food Preservation by Hurdle Technology. Springer.
12. Madigan, M. T., & Martinko, J. M. (2018). Biology of Microorganisms (15th ed.). Pearson.
13. Madigan, M. T., Martinko, J. M., Bender, K. S., Buckley, D. H., & Stahl, D. A. (2018). Brock Biology of Microorganisms (15th ed.). Pearson.
14. Mead, P. S., Slutsker, L., Dietz, V., McCaig, L. F., Bresee, J. S., Shapiro, C., ... & Tauxe, R. V. (1999). Food-Related Illness and Death in the United States. Emerging Infectious Diseases, 5(5), 607-625.
15. Motarjemi, Y., & Adams, M. (2006). Emerging Foodborne Pathogens. CRC Press.
16. Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (2008). Microbiology (5th ed.). McGraw-Hill.
17. Ray, B., & Bhunia, A. (2013). Fundamental Food Microbiology (5th ed.). CRC Press.
18. Sperber, W. H., & Doyle, M. P. (2009). Compendium of the Microbiological Spoilage of Foods and Beverages. Springer.
19. Tortora, G. J., Funke, B. R., & Case, C. L. (2020). Microbiology: An Introduction (14th ed.). Pearson.
20. Jay, James M. 2000 Modern Food Microbiology, CBS Publication, New Delhi,
21. Garbutt, John.1997 Essentials of Food Microbiology, Arnold, London.
22. Lawley, R., Curtis L. and Davis,J. , 2004 The Food Safety Hazard Guidebook , RSC publishing.
23. De Vries, 1997, Food Safety and Toxicity, CRC, New York.
24. Marriott, Norman G. , 1985, Principles of Food Sanitation, AVI, New York.
25. Forsythe, S J , 1987,Microbiology of Safe Food, Blackwell Science, Oxford, 2000 65 &Sons; USA.

BSND114-25: HUMAN PHYSIOLOGY

Total Marks: 100

L	T	P
3	1	0

Course objective:

To enable students to understand the structure and integrated functions of human physiological systems at cellular, tissue, and organ levels, and their relevance to nutrition, health, and homeostasis.

Course outcome: At the end of the course, the students will be able to

CO1	Describe the structure and function of cells, tissues, and basic physiological mechanisms involved in maintaining homeostasis.
CO2	Explain the organization and physiological roles of the musculoskeletal, nervous, circulatory, and blood systems.
CO3	Analyze the function and integration of the sensory, respiratory, digestive, and excretory systems in human health.
CO4	Illustrate the roles of endocrine glands and hormonal regulation in metabolism, growth, and reproduction.
CO5	Evaluate the interdependence of physiological systems in relation to nutrition, health, and disease management.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2
CO2	3	2	3	2	2
CO3	3	2	3	3	2
CO4	3	2	3	3	2
CO5	3	3	3	3	3

Details of the Course Content - BSND114-24: Human Physiology

Unit	Contents	Contact Hours
I	**Introduction to Human Physiology, Cells, and Tissues** **Introduction to Human Physiology**: Basic concepts of human physiology and its importance in health and nutrition. The relationship between physiology and nutrition and their role in maintaining homeostasis and overall well-being. **Cellular Physiology**: Structure and function of cells, including cellular metabolism and bioenergetics. Mechanisms of membrane transport (active and passive transport). Role of water, electrolytes, and the concept of cellular homeostasis in maintaining physiological balance. **Tissue Physiology**: Classification, structure, and function of the four major tissue types: epithelial, connective, muscular, and nervous tissues. Overview of their physiological roles in the human body. **Overview of Organ Systems**: Brief introduction to the key organ systems: circulatory, digestive, respiratory, and excretory systems, and their interactions. Physiological integration across systems to maintain health and function. **Physiology of Nerve and Muscle**: Mechanisms of nerve impulse conduction and muscle contraction. Role of neuromuscular junctions and muscle fiber types in bodily movements and functions.	13
II	**Musculoskeletal System, Nervous System, Blood, and circulatory System** **Musculoskeletal System:** Structure and function of bones and muscles. Types of muscles: skeletal, smooth, and cardiac. Mechanisms of muscle contraction, skeletal muscle physiology, and neuromuscular junctions. The role of calcium, ATP, and other factors in muscle function. **Nervous System:** General anatomy and functions of the central and peripheral nervous systems. Structure and function of neurons, brain, spinal cord, and peripheral nerves. Reflex arcs, autonomic nervous system, and its regulatory role in involuntary functions. **Blood Physiology:** Composition of blood: the role of red blood cells, white blood cells, platelets, and plasma in physiological processes. Blood clotting mechanism, blood volume, and function of the reticuloendothelial system in immunity. **Heart and Circulatory System:** Anatomy and physiology of the heart, blood vessels, and the conduction of the heartbeat. Cardiac cycle, cardiac output, heart sounds, blood pressure regulation, and the factors influencing blood pressure.	12
III	**Sense Organs, Respiratory, Digestive and Excretory System** **Sense Organs**: Physiology of vision, hearing, taste, smell, and cutaneous sensations. Mechanisms of sensory perception and their importance in the human interaction with the environment. **Respiratory System**: Anatomy of respiratory organs. Physiology of breathing and the mechanisms of gas exchange in the lungs. Regulation of respiration and respiratory volumes and factors influencing it. **Digestive System**: Anatomy and physiology of the gastrointestinal tract. Mechanisms of digestion and absorption of macronutrients (carbohydrates, proteins, fats) in the digestive system. Digestive enzymes and the role of bile in fat digestion.	11

IV	**Excretory, Endocrine, and Reproductive Systems** **Excretory System**: Structure and function of the kidneys and urinary system. Filtration, reabsorption, and secretion in the nephron. Regulation of water and electrolyte balance, acid-base balance, and the role of the kidneys in detoxification. **Endocrine System**: Structure and function of endocrine glands (pituitary, thyroid, adrenal, pancreas, gonads). Mechanisms of hormone action. Role of hormones in metabolism, growth, reproduction, and stress response. **Reproductive System**: Structure and function of male and female reproductive systems. The menstrual cycle, fertilization, pregnancy, and lactation. Hormonal regulation of the reproductive system and its implications for human health and nutrition.	11

Recommended Books and Resources

1. Guyton, A. C., & Hall, J. E. (2015). *Textbook of medical physiology* (13th ed.). Elsevier.
2. Tortora, G. J., & Derrickson, B. H. (2017). *Principles of anatomy and physiology* (15th ed.). Wiley.
3. Widmaier, E. P., Raff, H., & Strang, K. T. (2015). *Vander's human physiology: The mechanisms of body functions* (14th ed.). McGraw-Hill Education.
4. Perry, M. L., & Prescott, L. M. (2012). *Human physiology* (8th ed.). McGraw-Hill.
5. Sherwood, L. (2015). *Human physiology: From cells to systems* (9th ed.). Cengage Learning.
6. Silverthorn, D. U. (2016). *Human physiology: An integrated approach* (7th ed.). Pearson Education.
7. Marieb, E. N., & Hoehn, K. (2018). *Human anatomy & physiology* (11th ed.). Pearson Education.
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10. Patton, K. T., & Thibodeau, G. A. (2017). *Anatomy and physiology* (10th ed.). Elsevier.
11. Chatterjee, C. C. (2017). *Human physiology* (15th ed.). CBS Publishers & Distributors.
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16. Vander, A.J , Sherman, J.H. and Luciano, D.S. Human Physiology - the Mechanisms of Body Functions, 2nd ed., TMH Publishing Co., Ltd.
17. Subramaniam, S. and Madhavan Kutty, K. 1971. The Text Book of Physiology, 1st ed., Orient Longman Ltd.
18. Best, CH and NB Taylor, The living body, latest edition, Asia publishing house, Bombay.

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BSND115-25: PRINCIPLES OF HUMAN NUTRITION (LAB)

Total Marks: 50

L	T	P
0	0	2

Course objective:

To develop hands-on skills in biochemical and dietary assessment techniques related to carbohydrates, proteins, fats, vitamins, minerals, energy requirements, and nutritional evaluation for effective application in human nutrition and health planning.

Course outcome: At the end of the course, the students will be able to

CO1	Perform qualitative and quantitative tests to identify key nutrients such as carbohydrates, proteins, fats, vitamins, and minerals in food samples.
CO2	Apply biochemical assays to analyze nutrient composition, bioavailability, and retention during food processing and cooking.
CO3	Estimate calorific values and compute energy requirements based on individual activity levels.
CO4	Plan balanced meals and standardized diets using dietary guidelines and nutrition calculation tools.
CO5	Conduct nutritional assessments through anthropometric measurements, clinical signs, and dietary surveys to evaluate health and nutritional status.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	2	2	1
CO2	3	1	3	3	1
CO3	3	2	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Details of the Course Content - BSND115-25: PRINCIPLES OF HUMAN NUTRITION (LAB)

Practical no.	Contents	Contact Hours
1	Estimation of Calorific Value of Food	2
2	Qualitative Identification of Carbohydrates (Glucose, Fructose, Galactose, Sucrose, Maltose, Lactose)	2
3	Preparation of Osazones and Their Identification	2
4	Qualitative Identification of Amino Acids (Histidine, Tyrosine, Tryptophan, Cysteine, Arginine)	2
5	Qualitative Identification of Lipids (Solubility, Saponification, Acrolein Test, Salkowski Test, Lieberman-Burchard Test)	2
6	Qualitative Tests for Minerals (Calcium, Iron, etc.)	2
7	Quantitative Estimation of Glucose (Carbohydrate Analysis)	2
8	Computation of Energy Requirements Based on Activity (Energy Calculation)	2
9	Standardization of Snacks and Meals (Balanced Diet Planning)	2
10	Diet Survey and Anthropometric Measurements (Vulnerable Groups)	2
11	Assessment of Nutritional Status Using Clinical Signs	2
12	Determination of Vitamin C Content Using Titration Method (Vitamin Analysis)	2
13	Demonstration of Protein Efficiency Ratio (PER) (Protein Bioassay)	2
14	Fatty Acid Composition in Oils (Lipids Analysis)	2
15	Measurement of Iron Absorption Using Biochemical Assay	2
16	Analysis of Water Content in Different Food Samples	2
17	Effect of Cooking on Vitamin Retention in Vegetables	2
18	Digestive Enzyme Activity Test (Enzyme Analysis)	2

Recommended Books and Resources

1. Nielsen, S. S. (2017). *Food analysis* (5th ed.). Springer.
2. Belitz, H. D., Grosch, W., & Schieberle, P. (2009). *Food chemistry* (4th ed.). Springer.
3. Ranganna, S. (2001). *Handbook of analysis and quality control for fruit and vegetable products* (2nd ed.). Tata McGraw-Hill.
4. AOAC International. (2019). *Official methods of analysis of AOAC International* (21st ed.). AOAC International.
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6. Pomeranz, Y., & Meloan, C. E. (2000). *Food analysis: Theory and practice* (3rd ed.). Springer.
7. Plummer, D. T. (1987). *An introduction to practical biochemistry* (3rd ed.). McGraw-Hill.
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9. Mudambi, S. R., & Rajagopal, M. V. (2012). *Fundamentals of foods, nutrition and diet therapy* (6th ed.). New Age International.
10. Manay, S. N., & Shadaksharaswamy, M. (2004). *Foods: Facts and principles* (2nd ed.). New Age International.

BSND 116-25: INTRODUCTION TO FOOD SCIENCE (LAB)

Total Marks: 50

L	T	P
0	0	2

Course objective:

To develop foundational skills in food sampling, quality analysis, safety evaluation, and basic food preparation techniques using standard analytical methods and FSSAI-aligned practices.

Course outcome: At the end of the course, the students will be able to

CO1	Demonstrate safe laboratory practices, hygiene, sanitation, and correct use of food testing equipment and tools.
CO2	Perform sampling, preliminary quality testing, and proximate analysis of cereals, pulses, oilseeds, and spices.
CO3	Conduct basic physicochemical and nutritional evaluations of plant- and animal-based foods using standard procedures.
CO4	Identify common food adulterants and apply appropriate detection methods as per FSSAI guidelines.
CO5	Evaluate nutrient loss through different cooking methods and apply food preparation principles to create balanced dishes and beverages.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2
CO2	3	2	3	3	2
CO3	3	2	3	3	2
CO4	3	3	3	3	2
CO5	3	3	3	3	3

Details of the Course Content - BSND 116-25: INTRODUCTION TO FOOD SCIENCE (LAB)

Practical no.	Contents	Contact Hours
1	Introduction to lab safety, Hygiene, and Sanitation for Food Lab Testing, glassware, equipment, tools, weights, and measures used	2
2	Sampling and Quality Analysis for Food Lab Activities (FIC/N7603)	2
3	Determination of Moisture Content in Cereals	2
4	Detection of Antinutritional Factors in Pulses (e.g., trypsin inhibitors)	2
5	Estimation of Crude Fat Content in Oilseeds	2
6	Analysis of Total Soluble Solids (TSS) and ph in Fruit Juice	2
7	Determination of Enzymatic Browning and Prevention Techniques in Apples/Potatoes	2
8	Ash Content Determination in Spices	2
9	Quality Evaluation of Raw Egg (Float Test, Candling, ph)	2
10	Determination of Adulterants in different spices	2
11	Platform Tests of Raw Milk: COB, Alcohol, and Clot-On-Boiling Test	2
12	Measurement of Specific Gravity and Total Solids in Market Milk	2
13	Cooking Loss & Texture Evaluation of Meat Samples	2
14	Vitamin C Estimation in Fresh vs Cooked Vegetables (Titration Method)	2
15	Label Review and Nutritional Evaluation of Functional & Organic Foods	2
16.	Comparative Study on Nutrient Loss During Different Cooking Methods (Microwave vs Boiling)	2
17.	Market survey of essential raw and processed food products.	2
18.	Preparation of dishes and beverages using cereals, pulses, fruits, vegetables, milk and milk products, egg, fish and meat.	2

Recommended Books and Resources

1. FICSI. FIC/Q7601- Assistant Lab TechnicianFood and Agricultural Commodities.
2. Food Safety and Standards Authority of India (FSSAI). Manual of Methods of Analysis for Various Food Products. Retrieved from https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php.
3. Food Analysis Laboratory Manual (In-house developed manual with specific methods).
4. American Public Health Association, American Water Works Association, & Water Environment Federation. (2017). Standard Methods for the Examination of Water and Wastewater (23rd ed.). Washington, DC: American Public Health Association.
5. Food Safety and Standards Authority of India (FSSAI). (2018). Manual on Food Safety Laboratory Practices. New Delhi, India: FSSAI.
6. International Organization for Standardization (ISO). (n.d.). ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories**.** Geneva, Switzerland: ISO.
7. AOAC International. (2019). Official Methods of Analysis of AOAC International (21st ed.). Gaithersburg, MD: AOAC International.
8. Prosky, L., Asp, N.-G., Schweizer, T. F., DeVries, J. W., & Furda, I. (1985). Determination of Insoluble, Soluble, and Total Dietary Fiber in Foods and Food Products: Interlaboratory Study. *Journal of the Association of Official Analytical Chemists, 68*(4), 677-679.
9. American Spice Trade Association. (2000). ASTA Method of Analysis. Washington, DC: American Spice Trade Association.
10. Nielsen, S. S. (Ed.). (2010). *Food analysis* (4th ed.). Springer.
11. Sarker, D. K., & Nahar, N. (Eds.). (2016). *Handbook of food analysis* (3rd ed.). CRC Press.
12. BeMiller, J. N., & Whistler, R. L. (Eds.). (2009). *Carbohydrate chemistry for food scientists* (3rd ed.). AACC International.
13. Wrolstad, R. E., Acree, T. E., Decker, E. A., Penner, M. H., Reid, D. S., Schwartz, S. J., Shoemaker, C. F., & Smith, D. M. (Eds.). (2019). *Handbook of food analytical chemistry* (1st ed.). Wiley.
14. Valero, D., & Valverde, J. M. (Eds.). (2012). *Postharvest biology and technology of horticultural crops: Principles and practices for quality maintenance* (1st ed.). Woodhead Publishing.
15. Nollet, L. M. L., & Toldrá, F. (Eds.). (2012). *Handbook of analysis of active compounds in functional foods* (1st ed.). CRC Press.

16. Smith, J. L., & Charter, E. R. (Eds.). (2012). *Food chemical safety* (1st ed.). Springer.
17. Velasco, V., & Meléndez-Martínez, A. J. (Eds.). (2010). *Handbook of food science, technology, and engineering* (4th ed.). CRC Press.
18. Nielsen, S. S. (Ed.). (2016). *Food analysis laboratory manual* (2nd ed.). Springer.

BSND117-25: FOOD MICROBIOLOGY & FOOD SAFETY (LAB)

Total Marks: 50

L	T	P
0	0	2

Course objective:

To equip students with practical skills in microbiological techniques and food safety assessment by analyzing microbial presence, growth conditions, spoilage, and sanitation practices across various food and environmental samples, in accordance with national and international food safety standards.

Course outcome: At the end of the course, the students will be able to

CO1	Demonstrate aseptic techniques, media preparation, and microbial culture methods used in food microbiology labs.
CO2	Analyze the microbiological quality of different food samples (milk, water, fruits, vegetables, RTE foods) using standard quantitative and qualitative techniques.
CO3	Detect foodborne pathogens and spoilage organisms using gram staining, growth curve analysis, and rapid methods.
CO4	Evaluate the effectiveness of food sanitation, cleaning practices, and chemical disinfectants in reducing microbial loads.
CO5	Apply food safety management principles (e.g., HACCP, MPN, BIS/FSSAI guidelines) to ensure compliance with regulatory standards.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	1	3	2	1
CO2	2	2	3	2	2
CO3	3	1	3	2	2
CO4	2	2	2	3	2
CO5	2	3	3	3	3

Details of the Course Content - BSND117-25: FOOD MICROBIOLOGY & FOOD SAFETY (LAB)

Practical no.	Contents	Contact Hours
1	Introduction to Microbiology Lab: Aseptic techniques, sterilization methods, biosafety levels	3
2	Cleaning and Sanitation Evaluation in Food Contact Surfaces (Swab Test Method)	2
3	Media Preparation and Sterilization: Nutrient agar, MacConkey agar, Potato dextrose agar	2
4	Serial Dilution and Pour Plate Method for Total Plate Count (TPC) in Milk	2
5	Detection of Coliforms in Water/Milk by MPN (Most Probable Number) Method	2
6	Yeast and Mold Count in Bread or Fruit Juice (PDA method)	2
7	Isolation and Gram Staining of Bacteria from Raw Vegetables	2
8	Study of Bacterial Growth Curve Using Optical Density Measurement	2
9	Effect of pH and Temperature on Microbial Growth	2
10	Identification of Food Spoilage in Perishable Foods (e.g., fruits, dairy, meat)	2
11	Microbial Analysis of Fermented Food (e.g., curd, sauerkraut)	2
12	Detection of Foodborne Pathogens (e.g., Salmonella, E. coli) – Plate Culture or Rapid Test	2
13	Enumeration of Microorganisms in Ready-to-Eat Foods	2
14	Food Safety Management Tools: HACCP basics and Risk Identification Exercise	2
15	Air, Soil, and Water Microbiology – Plate Exposure & Serial Dilution Techniques	2
16	Microbiological Analysis of Processed vs Unprocessed Food	2
17	Sanitizer Effectiveness Test Against Common Foodborne Bacteria	2
18	Microbial Quality Testing of Packaged Drinking Water (BIS/FSSAI Guidelines)	2

Recommended Books and Resources

1. AOAC International. (2019). *Official methods of analysis of AOAC International* (21st ed.). AOAC International.
2. International Organization for Standardization. (2022). *ISO 7218: Microbiology of food and animal feeding stuffs – General requirements and guidance for microbiological examinations*. ISO.
3. FSSAI. (2021). *Manuals of Methods of Analysis for Foods*. Food Safety and Standards Authority of India. Retrieved from https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php
4. Bureau of Indian Standards. (2021). *IS 5402: Microbiology—General guidance for the enumeration of microorganisms—Colony count technique at 30°C*. BIS.
5. Jay, J. M., Loessner, M. J., & Golden, D. A. (2005). *Modern food microbiology* (7th ed.). Springer.
6. Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (2001). *Microbiology: Application-based approach* (5th ed.). Tata McGraw-Hill.
7. Cappuccino, J. G., & Welsh, C. (2020). *Microbiology: A laboratory manual* (12th ed.). Pearson Education.
8. Adams, M. R., & Moss, M. O. (2008). *Food microbiology* (3rd ed.). Royal Society of Chemistry.
9. Garbutt, J. (1997). *Essentials of food microbiology*. Arnold Publishers.
10. Frazier, W. C., & Westhoff, D. C. (2014). *Food microbiology* (5th ed.). Tata McGraw-Hill.
11. Gatchalian, M. M. (2011). *Food safety and quality management systems*. Springer.
12. Food and Agriculture Organization (FAO). (2006). *Manual of food quality control: Microbiological analysis*. Retrieved from https://www.fao.org/3/T0814E/T0814E00.htm

13. National Institute of Open Schooling (NIOS). (2016). *Food Safety and Standards – Study Material*. Retrieved from https://nios.ac.in

14. Codex Alimentarius Commission. (2009). *General Principles of Food Hygiene: CXC 1-1969 (Rev. 2020)*. FAO/WHO.

15. World Health Organization (WHO). (2008). *Basic microbiology techniques: Training modules for laboratory workers*. Retrieved from https://www.who.int

16. Food Standards Australia New Zealand. (2013). *Safe food Australia – A guide to the food safety standards*. Retrieved from https://www.foodstandards.gov.au

17. ICMSF. (2005). *Microorganisms in foods 7: Microbiological testing in food safety management*. Springer.

BSND118-25: HUMAN PHYSIOLOGY (LAB)

Total Marks: 50

L	T	P
0	0	2

Course objective:

To provide hands-on experience in human physiological assessments, microscopy, hematological testing, organ system analysis, and endocrine and nutritional health evaluations to reinforce theoretical concepts essential for understanding the human body's structure, function, and response to nutritional interventions.

Course outcome: At the end of the course, the students will be able to

CO1	Demonstrate safe laboratory practices and effectively operate instruments such as microscopes, sphygmomanometers, and spirometers in a physiology lab setting.
CO2	Perform microscopic identification and analysis of blood cells, tissues, and organ sections, and interpret physiological responses.
CO3	Conduct basic physiological measurements including blood pressure, hemoglobin levels, respiratory volumes, and biochemical parameters such as urine and salivary enzyme tests.
CO4	Assess sensory and motor responses through reflex testing, visual and auditory examinations, and muscular strength evaluation.
CO5	Analyze physiological processes related to the endocrine, reproductive, and digestive systems and relate them to nutrition and health through case studies and visual learning tools.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	1
CO2	3	2	3	2	2
CO3	3	2	3	2	1
CO4	2	3	2	2	2
CO5	3	2	3	2	3

Details of the Course Content - BSND118-25: HUMAN PHYSIOLOGY (LAB)

Practical no.	Contents	Contact Hours
1	Introduction to Lab Safety, Instruments (Sphygmomanometer, Microscope, Spirometer), and Lab Etiquette	3
2	Microscopic Examination of Human Blood Smear: RBCs, WBCs, Platelets	2
3	Estimation of Hemoglobin (Sahli's method or digital)	2
4	Measurement of Blood Pressure and Pulse Rate Using Sphygmomanometer	2
5	Determination of Bleeding Time and Clotting Time	2
6	Identification of Human Tissues (epithelial, muscular, connective, nervous) under Microscope	2
7	Reflex Action and Reaction Time (Ruler drop or Visual Reaction Timer)	2
8	Assessment of Visual Acuity and Color Blindness (Snellen's chart, Ishihara test)	2
9	Spirometry: Lung Volume and Respiratory Rate Estimation	2
10	Examination of Digestive Enzymes: Salivary Amylase Activity on Starch	2
11	Urine Analysis: Physical Characteristics and Simple Chemical Tests (protein, glucose, pH)	2
12	Assessment of Muscular Fatigue and Grip Strength (Dynamometer or handgrip test)	2
13	Study of Menstrual Cycle Using Charts and Hormonal Changes Discussion	2
14	Study of Endocrine Glands with Models/Charts and Disorders Discussion (e.g., goitre, diabetes)	2
15	Case Study Presentation: e.g., Physiological Impacts of Nutritional Deficiencies	2
16	Microscopic Study of Digestive Organs (Pancreas, Liver, Small Intestine, Stomach)	2
17	Microscopic Study of Respiratory Organs (Lung, Trachea)	2
18	Microscopic Study of Excretory Organs (Kidney and Nephron)	2
19	Blood Grouping Using Agglutination Reaction	2

Recommended Books and Resources

1. Jain, A. K. (2022). *Manual of practical physiology* (3rd ed.). Arya Publications.
2. Sembulingam, K., & Sembulingam, P. (2021). *Essentials of medical physiology* (9th ed.). Jaypee Brothers Medical Publishers.
3. Guyton, A. C., & Hall, J. E. (2020). *Textbook of medical physiology* (14th ed.). Elsevier.
4. Tortora, G. J., & Derrickson, B. (2022). *Principles of anatomy and physiology* (16th ed.). Wiley.
5. Goyal, R. K., & Mehta, A. A. (2015). *Practical manual of physiology*. B. S. Shah Prakashan.
6. Ross, M. H., & Pawlina, W. (2021). *Histology: A text and atlas* (8th ed.). Wolters Kluwer.
7. Chaurasia, B. D. (2022). *Human anatomy and physiology* (Vol. I–IV). CBS Publishers.
8. Sharma, P. V. (2018). *Laboratory manual of physiology*. CBS Publishers.
9. Subrahmanyam, K. S., & Singh, S. (2022). *Textbook of human physiology for dental students* (5th ed.). Elsevier India.
10. WHO. (2008). *Training modules in physiology and anatomy for health professionals*. Retrieved from https://www.who.int
11. Labster. (2021). *Virtual lab simulations: Human physiology*. Retrieved from https://www.labster.com/simulations/physiology

12. Harvard University. (2021). *LabXchange virtual physiology labs*. Retrieved from https://www.labxchange.org
13. Bureau of Indian Standards (BIS). (2021). *IS 15185: Methods of blood pressure measurement using sphygmomanometer*. BIS.
14. Lippincott Williams & Wilkins. (2019). *Atlas of human anatomy and physiology*. Lippincott Press.
15. Marieb, E. N., & Hoehn, K. (2018). *Human anatomy & physiology* (11th ed.). Pearson Education.

HVPE101-18: Human Values, De-Addiction And Traffic Rules

Total Marks: 50

L	T	P
0	0	2

Course objective:

To equip students with comprehensive communication skills, including theory, types, and modes of communication, proficiency in verbal and non-verbal language, enhanced reading and interpretation abilities, and effective writing techniques, preparing them for diverse personal, social, and professional contexts.

Course outcome: At the end of the course, the students will be able to

CO1	Students will develop a comprehensive understanding of the theory, types, and modes of communication, enabling effective verbal and non-verbal interactions across various contexts.
CO2	Students will gain proficiency in spoken and written communication, encompassing personal, social, and business scenarios, and learn strategies to overcome communication barriers.
CO3	Students will master close reading, comprehension, summary paraphrasing, and analysis, fostering critical thinking and interpretive abilities through diverse texts, including translations between Hindi/Punjabi and English.
CO4	Students will acquire essential writing skills for documenting, report writing, note-making, and letter writing, enhancing their ability to produce clear and structured written communication.
CO5	Students will develop effective intra-personal, inter-personal, and group communication skills, preparing them for collaborative and professional environments.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	1	3	2	1	2
CO2	1	3	2	2	2
CO3	2	2	3	1	2
CO4	2	2	2	3	1
CO5	1	3	2	2	3

Details of the Course Content - Human Values, De-Addiction And Traffic Rules (HVPE101-18)

Unit	Contents	Contact Hours
I	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** 1. Understanding the need, basic guidelines, content and process for Value Education 2. Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels	6
II	**Understanding Harmony in the Human Being - Harmony in Myself!** 1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' 2. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 4. Understanding the characteristics and activities of 'I' and harmony in 'I' 5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail 6. Programs to ensure Sanyam and Swasthya- Practice Exercises and Case Studies will be taken up in Practice Sessions.	6
III	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** 1. Understanding harmony in the Family- the basic unit of human interaction 2. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship 3. Understanding the meaning of Vishwas; Difference between intention and competence 4. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship 5. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals	6

	6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!- Practice Exercises and Case Studies will be taken up in Practice Sessions.	
IV	**Understanding Harmony in the Nature and Existence - Whole existence as Co-existence** 1. Understanding the harmony in the Nature 2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature 3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all- pervasive space 4. Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions.	4
V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics** 1. Natural acceptance of human values 2. Definitiveness of Ethical Human Conduct 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 4. Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for above production systems. 5. Case studies of typical holistic technologies, management models and production systems 6. Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations	6

Recommended Books and Resources

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and HarperCollins, USA
3. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
4. A Nagraj, 1998, *Jeevan Vidya ek Parichay,* Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991
6. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
7. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
8. Subhas Palekar, 2000, *How to practice Natural Farming,* Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limitsto Growth – Club of Rome's report*, Universe Books.

10. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers ,* Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including HumanValues)*, Eastern Economy Edition, Prentice Hall of India Ltd.
12. B P Banerjee, 2005, *Foundations of Ethics and Management,* Excel Books.
13. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
14. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, *http://uhv.ac.in*
2. Story of Stuff, *http://www.storyofstuff.com*
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*

HVPE102-18: HUMAN VALUES, DE-ADDICTION AND TRAFFIC RULES (LAB/ SEMINAR)

Total marks: 25	**L**	**T**	**P**
	0	**0**	**1**

Course objective:

This course aims to facilitate students in self-exploration and understanding of human values to recognize the interconnection between personal well-being and societal harmony, ultimately empowering them to develop sustainable solutions for societal problems.

Course outcome: At the end of the course, the students will be able to

CO1	Students will develop a profound understanding of human values and their relevance in addressing global and societal issues.
CO2	They will gain skills in self-exploration and reflection, enabling them to set and achieve personal and professional goals aligned with ethical principles.
CO3	The course will equip students with the ability to distinguish between the needs of the self and the body, fostering holistic well-being.
CO4	Students will learn to apply their knowledge to improve interpersonal relationships and contribute positively to society.
CO5	They will be empowered to devise and implement sustainable solutions for societal challenges, promoting a harmonious and prosperous community.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	1	2
CO2	1	3	3	2	3
CO3	3	2	2	2	3
CO4	2	3	2	3	**3**
CO5	2	3	3	3	3

Details of the Course Content -Human Values, De-Addiction And Traffic Rules (Lab/ Seminar) (HVPE102-18)

Practical no.	Contents	Contact Hours
1	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education	14
2	Understanding Harmony in the Human Being - Harmony in Myself!	
3	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship	
4	Understanding Harmony in the Nature and Existence - Whole existence as Co-existence	
5	Implications of the above Holistic Understanding of Harmony at all Levels of Existence	
6	One each seminar will be orgnizied on Drug De-addiction and Traffic Rules. Eminent scholar and experts of the subject will be called for the Seminar atleast once during the semester. It will be binding for all the students to attend the seminar.	

Recommended Books and Resources

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. Ivan Illich, 1974, *Energy & Equity,* The Trinity Press, Worcester, and HarperCollins, USA
3. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond & Briggs, Britain.
4. A Nagraj, 1998, *Jeevan Vidya ek Parichay,* Divya Path Sansthan, Amarkantak.
5. Sussan George, 1976, *How the Other Half Dies,* Penguin Press. Reprinted 1986, 1991
6. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Purblishers.
7. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.
8. Subhas Palekar, 2000, *How to practice Natural Farming,* Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limitsto Growth – Club of Rome's report*, Universe Books.
10. E G Seebauer & Robert L. Berry, 2000, *Fundamentals of Ethics for Scientists & Engineers ,* Oxford University Press
11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, *Engineering Ethics (including HumanValues)*, Eastern Economy Edition, Prentice Hall of India Ltd.
12. B P Banerjee, 2005, *Foundations of Ethics and Management,* Excel Books.
13. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
14. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, *http://uhv.ac.in*
2. Story of Stuff, *http://www.storyofstuff.com*
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*

BTHU103-18: ENGLISH

Total marks: 100	**L**	**T**	**P**
	1	**0**	**0**

Course objective:

To equip students with comprehensive communication skills, including theory, types, and modes of communication, proficiency in verbal and non-verbal language, enhanced reading and interpretation abilities, and effective writing techniques, preparing them for diverse personal, social, and professional contexts.

Course outcome: At the end of the course, the students will be able to

CO1	Students will develop a comprehensive understanding of the theory, types, and modes of communication, enabling effective verbal and non-verbal interactions across various contexts.
CO2	Students will gain proficiency in spoken and written communication, encompassing personal, social, and business scenarios, and learn strategies to overcome communication barriers.
CO3	Students will master close reading, comprehension, summary paraphrasing, and analysis, fostering critical thinking and interpretive abilities through diverse texts, including translations between Hindi/Punjabi and English.
CO4	Students will acquire essential writing skills for documenting, report writing, note-making, and letter writing, enhancing their ability to produce clear and structured written communication.
CO5	Students will develop effective intra-personal, inter-personal, and group communication skills, preparing them for collaborative and professional environments.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	2	2	2	1
CO2	2	3	2	1	2
CO3	3	2	3	2	2
CO4	2	1	1	3	2
CO5	2	2	2	2	3

Details of the Course Content - English (BTHU103-18)

Unit	Contents	Contact Hours
I	**Introduction:** Theory of Communication, Types and Modes of Communication	3
II	**Language of Communication:** Verbal and Non-verbal, Spoken and Written, Personal, Social and Business, Barriers and Strategies, Intra-personal, Inter-personal and Group communication	4
III	**Reading and Understanding**: Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation(from Hindi/Punjabi to English and vice-versa), Literary/Knowledge Texts	4
IV	**Writing Skills:** Documenting, Report Writing, Making notes, Letter writing	4

Recommended Books and Resources

1. Oxford University Press. (2020). *Fluency in English - Part II*.
2. Pearson. (2022). *Business English*.
3. Orient Blackswan. (2023). *Language, Literature and Creativity*.
4. Mishra, G., Kaul, R., & Biswas, B. (Eds.). (forthcoming). *Language through Literature*.
5. Zinsser, W. (2021). *On Writing Well*. Harper Resource Book.
6. Hamp-Lyons, L., & Heasly, B. (2021). *Study Writing*. Cambridge University Press.
7. Crystal, D. (2003). English as a Global Language (2nd ed.). Cambridge University Press.
8. Halliday, M. A. K., & Matthiessen, C. (2014). Halliday's Introduction to Functional Grammar (4th ed.). Routledge.
9. Hyland, K. (2019). Second Language Writing (2nd ed.). Cambridge University Press.
10. McCarthy, M. (1991). Discourse Analysis for Language Teachers. Cambridge University Press.
11. Swales, J. M., & Feak, C. B. (2012). Academic Writing for Graduate Students (3rd ed.). University of Michigan Press.
12. Brown, G., & Yule, G. (1983). *Discourse Analysis*. Cambridge University Press.

BTHU104-18: ENGLISH (LAB)

Total marks: 50	**L**	**T**	**P**
	0	**0**	**2**

Course objective:

The objective of this course is to enhance students' proficiency in oral communication through interactive practice sessions, covering listening comprehension, self-introduction, group discussions, role plays, everyday conversations, workplace communication, interviews, formal presentations, monologues, effective communication strategies, and public speaking.

Course outcome: At the end of the course, the students will be able to

CO1	Demonstrate improved listening comprehension and engage effectively in self-introductions, group discussions, and role plays.
CO2	Navigate common everyday situations with confidence through effective conversations and dialogues.
CO3	Communicate proficiently in workplace settings, including conducting and participating in interviews.
CO4	Deliver formal presentations and monologues with clarity and professionalism.
CO5	Identify and rectify miscommunication, ensuring effective public speaking and overall communication skills.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	1	3	2	1	2
CO2	1	3	2	1	2
CO3	1	3	3	2	2
CO4	1	3	2	3	2
CO5	1	3	2	2	3

Details of the Course Content - English (Lab) (BTHU104-18)

Practical no.	Contents	Contact Hours
	Interactive practice sessions in Language Lab on Oral Communication	
1	Listening Comprehension	2
2	Self Introduction, Group Discussion and Role Play	4
3	Common Everyday Situations: Conversations and Dialogues	4
4	Communication at Workplace	2
5	Interviews	2
6	Formal Presentations	4
7	Monologue	2
8	Effective Communication/ Mis- Communication	2
9	Public Speaking	4

Recommended Books and Resources

1. Oxford University Press. (2020). *Fluency in English - Part II*.
2. Pearson. (2022). *Business English*.
3. Swan, M. (2021). *Practical English Usage* (4th ed.). Oxford University Press.
4. Kumar, S., & Lata, P. (2018). *Communication Skills* (2nd ed.). Oxford University Press.
5. CIEFL, Hyderabad. (2019). *Exercises in Spoken English* (Parts I-III). Oxford University Press.

BMPD101-18: MENTORING AND PROFESSIONAL DEVELOPMENT

Total marks: 25	**L**	**T**	**P**
	0	**0**	**1**

Course objective:

The objective of mentoring is to develop overall personality, technical and general aptitude, general awareness, communication skills, and presentation skills.

Course outcome: At the end of the course, the students will be able to

CO1	Demonstrate enhanced technical and general aptitude through expert lectures and aptitude tests.
CO2	Exhibit improved communication and presentation skills via group discussions, quizzes, and student presentations.
CO3	Develop effective teamwork and leadership abilities through team-building exercises and outdoor activities.
CO4	Gain a broader understanding of current affairs and general knowledge, facilitated by diverse classroom interactions and society activities.
CO5	Show increased engagement in extracurricular and community service activities, contributing to holistic personal and professional growth.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**
CO1	2	3	2	1	2
CO2	1	3	2	2	2
CO3	1	3	2	1	3
CO4	2	2	3	2	2
CO5	1	2	2	1	3

Details of the Course Content - Mentoring and Professional Development (BMPD101-18): The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Practical no.	Contents	Contact Hours
	Part – A (Class Activities)	14
1	Expert and video lectures	
2	Aptitude Test	
3	Group Discussion	
4	Quiz (General/Technical)	
5	Presentations by the students	
6	Team building Exercises	
	Part – B (Outdoor Activities)	
1	Sports/NSS/NCC	
2	Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc	

The evaluation shall be based on rubrics for Part – A & B Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

SEMESTER-II

Course Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BSND121-25	Basics of Cooking	3	1	0	40	60	100	4
BSND122-25	Food Processing & Preservation	3	1	0	40	60	100	4
BSND123-25	Food Chemistry	3	1	0	40	60	100	4
BSND124-25	Food Packaging	3	1	0	40	60	100	4
BSND125-25	Basics of Cooking (Lab)	0	0	4	30	20	50	2
BSND126-25	Food Processing & Preservation (Lab)	0	0	4	30	20	50	2
BSND127-25	Food Chemistry (Lab)	0	0	4	30	20	50	2
EVS102-18	Environmental Science	2	0	0	40	60	100	2
BSND128-25	Basics of Computer	2	0	0	20	30	50	2
BSND129-25	Mentoring & Professional Development	0	0	1	25	--	25*	1
	Total	**16**	**4**	**13**	**335**	**390**	**725**	**27**

*The Mentoring & Professional Development course will have internal evaluation only.

BSND121-25: BASICS OF COOKING

Course outcome: At the end of the course, the students will be able to

CO1	Develop an understanding of kitchen organization, including appropriate attire, personal hygiene, safety practices, and the selection, use, care, and maintenance of kitchen equipment.
CO2	Explain common culinary terminology and the fundamental principles of cooking, including heat transfer methods, temperature control, and the physical and chemical changes that occur in food during cooking.
CO3	Apply principles and practices of various cooking methods such as boiling, steaming, frying, roasting, baking, pressure cooking, grilling, microwave cooking, and combination methods for different food groups.
CO4	Explain the effects of different cooking techniques on texture, flavour, digestibility, and nutritional value of foods, and implement strategies to minimize nutrient loss during food preparation.
CO5	Demonstrate basic culinary skills including recipe standardization, portion control, menu planning, use of thickening and binding agents, preparation of stocks, and planning of balanced and therapeutic diets.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	2	3	1	2	1
CO2	3	1	2	1	1
CO3	3	1	2	2	1
CO4	3	1	3	2	2
CO5	3	2	2	2	3

BSND121-25: BASICS OF COOKING

Total Marks: 100	L	T	P
	3	1	0

UNIT- I

Kitchen attire and equipment: Types, uses, care and maintenance of large and small kitchen tools, personal hygiene, and safety measures.

Terminology used in cooking: Common culinary terms and basic food preparation vocabulary.

Effects of cooking on food: Physical and chemical changes, impact on texture, flavour, digestibility, and nutritive value, and measures to reduce nutrient loss during cooking.

Cooking of food: Heat, temperature, and methods of heat transfer such as conduction, convection, and radiation. Classification of cooking methods into moist heat, dry heat, and combination methods.

UNIT- II

Principles and practices of boiling, simmering, steaming, frying (shallow and deep), stewing, pressure cooking, roasting, and baking: Correct procedures, temperature control, advantages, limitations, and suitability for different food groups such as cereals, pulses, vegetables, fruits, meat, poultry, fish, eggs, and milk products.

UNIT- III

Principles and practices of braising, grilling, infrared cooking, microwave cooking, and combined methods of cookery: Understanding of equipment used, temperature regulation, safety precautions, and suitability of each method for different food groups. Application of combination cooking techniques to improve flavour, texture, and overall quality of prepared foods.

UNIT- IV

Basics of culinary practices: Importance of culinary skills, recipe standardization, portion control, and presentation.

Types of menus: À la carte, Table d'hôte, buffet, cyclic, and institutional menus.

Types of different diets: Balanced, therapeutic, vegetarian, non-vegetarian, and special diets for specific health conditions.

Thickening and binding agents: Roux, starches, gelatin, and eggs.

Flavoring stocks: Stock types, their preparation, importance, essences, and glazes.

Recommended Readings:

1. B. Shrilakshmi, Food Science, Ed. 9, New Age International Publishers.
2. N. Shakuntala Manay & M. Shadaksharaswamy, Food: Facts and Principles, Ed. 4, New Age International Publishers.

BSND122-25: FOOD PROCESSING & PRESERVATION

Ccourse outcome: At the end of the course, the students will be able to

CO1	Explain the scope, importance, and principles of food preservation, causes of food spoilage, shelf-life concepts, and the role and classification of microorganisms associated with foods.
CO2	Describe food preservation methods using low and high temperatures, including refrigeration, freezing, pasteurization, sterilization, blanching, and their effects on food quality.
CO3	Describe preservation techniques based on moisture control such as drying, dehydration, and evaporation, including their principles, equipment, and factors affecting efficiency.
CO4	Explain the principles and applications of food preservation by irradiation and chemical preservatives, including mechanisms of action, types of preservatives, and their effects on food safety and quality.
CO5	Compare and assess different food preservation methods in terms of effectiveness, suitability for various food types, and impact on shelf life, safety, and nutritional quality.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	1	2	1	1
CO2	3	1	2	2	1
CO3	3	1	3	2	1
CO4	3	2	2	2	1
CO5	3	2	3	2	2

BSND122-25: FOOD PROCESSING & PRESERVATION

Total Marks: 100

L	T	P
3	1	0

UNIT- I

Scope and importance of food preservation, Historical developments in food processing. Types of foods and causes of food spoilage. Definition of shelf life, perishable foods, semi perishable foods, shelf stable foods. Principles of Food Preservation.

Food Microbiology: microorganisms associated with foods- bacteria, yeast and mold, Importance of bacteria, yeast and molds in foods. Classification of microorganisms based on temperature, pH, water activity, nutrient and oxygen requirements, typical growth curve of micro-organisms.

UNIT- II

Food Preservation by Low temperature

Freezing and Refrigeration: Introduction to refrigeration, cool storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, types of freezing i.e. slow freezing, quick freezing, introduction to thawing, changes during thawing and its effect on food.

Food Preservation by high temperature

Thermal Processing- Commercial heat preservation methods: Sterilization, commercial sterilization, Pasteurization, and blanching.

UNIT- III

Food Preservation by Moisture control

Drying and Dehydration - Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), heat and mass transfer, factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry.

Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry.

UNIT- IV

Food Preservation by Irradiation

Introduction, units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry, concept of cold sterilization.

Food Preservation by Preservatives: Uses and effects of class I and class II preservatives in foods.

Recommended Readings:

1. Sivasankar, B. *Food processing and preservation:* Hall of India Pvt., New Delhi.
2. B. Shrilakshmi, Food Science, Ed. 9, New Age International Publishers.
3. R.P. Srivastava & Sanjeev Kumar, Fruits and Vegetable Preservation Principles and Practices, Ed. 3, CBS Publishers and Distributors Pvt. Ltd.
4. Bawa. A.S, O.P Chauhan etal. Food Science. New India Publishing agency.
5. Fellows, P. J. *Food processing Technology: Principles and Practice:* Woodhead Publishing.
6. Brennan, J. G. (2006). *Food Processing Handbook:* Weinheim: Wiley-VCH.
7. Zeuthen, P. & Bogh- Sprensen, L. (2003). Food Preservation Techniques: CRC Press, Boca raton.
8. Vonloesecka, H. W. (1998). *Drying and Dehydration of Foods:* Allied, Bikaner.
9. Frazier WC and Westhoff DC, Food Microbiology, TMH Publication, New Delhi, 2004

BSND123-25: Food Chemistry

Ccourse outcome: At the end of the course, the students will be able to

CO1	Explain the fundamental concepts, scope, and development of food chemistry, with special emphasis on the structure, properties, and role of water and water activity in food stability and shelf life.
CO2	Describe the classification, structure, chemical reactions, and functional properties of carbohydrates and proteins, and analyse their behaviour in food systems.
CO3	Evaluate the physical and chemical properties of lipids, including quality assessment parameters, processing technologies, and changes occurring during storage and frying.
CO4	Explain the significance, stability, enrichment, and fortification of water-soluble and fat-soluble vitamins during food processing and storage.
CO4	Analyse the chemical nature of food flavours, including flavour compounds and enhancers, and their contribution to sensory characteristics and overall food quality.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	–	2	2	1
CO2	3	–	3	2	1
CO3	3	–	3	3	1
CO4	3	–	2	2	2
CO5	2	–	2	2	1

BSND123-25: Food Chemistry

Total Marks: 100	L	T	P
	3	1	0

UNIT- I

Introduction to Food Chemistry: Definition, nature, scope and development of food chemistry.

Water: Definition of water in food, Structure of water and ice, Types of water, Sorption phenomenon, Water activity and packaging, Water activity and shelf-life.

UNIT- II

Carbohydrates: Classification (mono, oligo and polysaccharides); Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums); Chemical reactions of carbohydrates –oxidation, reduction, with acid & alkali; Modified celluloses and starches

Proteins: Protein classification and structure; Nature of food proteins (plant and animal proteins); Properties of proteins (electrophoresis, sedimentation, amphoterism, and denaturation); Functional properties of proteins (e.g., organoleptic properties, solubility, viscosity, binding, gelation/texturization, emulsification, and foaming).

UNIT- III

Lipids: Classification of lipids, Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties: Reichert–Meissl (RM) value, Polenske value, iodine value, peroxide value, saponification value. Effect of frying on fats; Changes in fats and oils- rancidity, lipolysis, flavor reversion; Auto-oxidation and its prevention; Technology of edible fats and oils- Refining, Hydrogenation and Interesterification, Fat Mimetics.

UNIT- IV

Vitamins: Significance and stability of vitamins during processing, enrichment, fortifications; Water soluble vitamins; Fat soluble vitamins.

Flavour: Description of food flavours; Flavour enhancers; Flavor compounds -terpenoids, flavonoids, Sulphur compounds and volatile flavor compounds.

Recommended readings:

1. Satyanarayana, U & Chakrapani U. Biochemistry, 4th Ed., Elsevier India
2. Harish Kumar Chopra & Paramjit Singh Panesar. Food Chemistry, Narosa, India.
3. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
4. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
5. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
6. Potter, N.N. and Hotchkiss, J.H, Food Science, 5th Ed., Chapman & Hall,1995
7. DeMan, J.M., Principles of Food Chemistry, AVI, NewYork, 1980

BSND124-25: FOOD PACKAGING

Course outcome: At the end of the course, the students will be able to

CO1	Explain the principles and functions of food packaging in preserving nutritional quality, including packaging regulations, labelling requirements, barcodes, and their impact on food safety and consumer health choices.
CO2	Describe different packaging materials such as paper, biodegradable materials, plastics, laminates, metals, and glass, and evaluate their suitability for nutrient-sensitive foods and environmental sustainability.
CO3	Apply packaging strategies for fresh and processed foods to minimize nutrient loss, including permeability testing and regulatory aspects related to nutrient claims.
CO4	Describe packaging machinery and advanced systems such as aseptic, intelligent, and active packaging in protecting nutritional quality during storage and transportation.
CO5	Understand methods used to measure packaging performance and determine its impact on nutrient retention, shelf life, and overall nutritional worthiness of food products.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	3	2	2	2
CO2	2	1	2	3	2
CO3	3	2	3	3	2
CO4	2	1	2	3	1
CO5	3	1	3	2	1

BSND124-25: FOOD PACKAGING

Total Marks: 100	L	T	P
	3	1	0

UNIT- I

Introduction to food packaging-Functions of packaging in preserving nutritional quality.

Packaging regulations and labelling requirements for nutritional information –Barcodes and other markings, impact of packaging on food safety and consumer health choices.

Overview of packaging types and their effect on nutrient retention.

UNIT- II

Paper and biodegradable materials for nutrient sensitive foods.

Plastics and laminates- Selection based on nutrient preservation.

Metal packaging {tin plates, cans} and their influence on micronutrient stability.

Glass-Properties, uses and types of containers used in food packaging,

Environmental sustainability in nutrition packaging and recycling practices.

UNIT- III

Packaging strategies for fresh produce to maintain vitamins and antioxidants**.**

Packaging for processed foods to minimize nutrient loss-Frozen, fortified foods and convenience foods.

Testing packaging for oxygen and moisture permeability affecting nutritional value**.**

Regulatory aspects of nutrient claims on packed foods.

UNIT- IV

Packaging machinery for aseptic and intelligent packaging that protects nutritional quality.

Evaluation of packaging performance in transport and storage regarding nutrient retention.

Methods to assess packaging's effect on food nutritional worthiness.

Active packaging systems that enhance shelf life and nutrient stability.

Recommended readings:

1. Robertson GL, Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group,2012
2. Coles R, McDowell D, Kirwan MJ Food Packaging Technology. Blackwell, 2003
3. Paine FA and Paine HY, A Handbook of Food Packaging, Blackie Academic and Professional, 1992

BSND125-25: BASICS OF COOKING (LAB)

Course outcome: At the end of the course, the students will be able to

CO1	Demonstrate the preparation of basic recipes from different food groups such as cereals, pulses, eggs, vegetables, fruits, and milk products following standard procedures.
CO2	Apply various cooking methods including boiling, steaming, frying, stewing, roasting, braising, grilling, microwave cooking, and combination methods in practical food preparation.
CO3	Develop skills in maintaining hygiene, safety, time management, and proper use of kitchen equipment during laboratory practice.
CO4	Demonstrate the effect of different cooking methods on texture, flavour, appearance, and overall acceptability of prepared dishes.
CO5	Practice portion control, presentation techniques, and recipe standardization to ensure consistency and quality in food preparation.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	PO2	PO3	PO4	PO5
CO1	3	1	1	2	1
CO2	3	1	2	3	1
CO3	2	3	1	2	2
CO4	2	1	3	1	1
CO5	2	2	2	2	1

BSND125-25: BASICS OF COOKING (LAB)

Total Marks: 50	L	T	P
	0	0	4

Course Contents:

1. **Preparation of recipes from different food groups, such as**

   a. **Cereals** – Vegetable Pulao / Plain Rice / Upma
   b. **Pulses** – Moong Dal Tadka / Rajma Curry / Chole
   c. **Eggs** – Boiled Egg / Omelette / Egg Curry
   d. **Vegetables** – Mixed Vegetable Curry / Vegetable Stir Fry
   e. **Fruits** – Fruit Salad / Banana Shake / Apple Custard
   f. **Milk** – *Kheer* / Custard / Paneer Preparation

2. **Preparation of food products using various cooking methods**

   a. **Boiling** – Boiled Rice / Boiled Vegetables / Boiled Eggs
   b. **Steaming** – *Idli* / Steamed Vegetables / Dhokla
   c. **Frying** – *Poori* / *Pakora* / French Fries
   d. **Stewing** – Vegetable Stew / Chicken Stew
   e. **Roasting** – Roasted Peanuts / Roasted Chicken / Roasted Vegetables
   f. **Braising** – Braised Vegetables / Braised Chicken
   g. **Grilling** – Grilled Sandwich / Grilled Paneer / Grilled Chicken
   h. **Microwave Cooking** – Microwave Mug Cake / Steamed Vegetables (Microwave)
   i. **Methods in Combination** – Biryani (Boiling + Dum Cooking) / Shahi Paneer (Frying + Stewing)

BSND126-25: FOOD PROCESSING & PRESERVATION (LAB)

Course outcome: At the end of the course, the students will be able to

CO1	Apply appropriate sampling techniques and prepare representative test samples for food quality and preservation analysis.
CO2	Perform laboratory techniques related to food preservation such as pasteurization, blanching, dehydration, pickling, curing, bottling, and aseptic practices.
CO3	Determine and interpret key physicochemical parameters including pH, moisture content, and sodium chloride concentration in preserved foods.
CO4	Understand the effects of different preservation methods such as drying, freezing, canning, microwave processing, and use of chemical preservatives on food quality and shelf life.
CO5	Understand microbial stability and safety aspects of preserved foods through practical assessment of pH, sterilization methods, and cut-out analysis of canned products.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	1	3	2	1
CO2	3	2	2	3	1
CO3	3	1	3	2	1
CO4	3	1	3	3	1
CO5	3	3	3	2	2

BSND126-25: FOOD PROCESSING & PRESERVATION (LAB)

Total Marks: 50	L	T	P
	0	0	4

Course Contents:

1. Sampling techniques and preparation of test samples.
2. Concept of shelf life of different foods
3. To study the concept of Asepsis and sterilization
4. Determination of pH of different foods using pH meter.
5. Study quality characteristics of foods preserved by drying/dehydration/ freezing.
6. To perform pasteurization of fluids using different methods.
7. To perform blanching of different plant foods.
8. Pickling and curing of foods.
9. Determination of sodium chloride in brine.
10. Determination of moisture content in fresh and dried food samples.
11. Effect of pH on microbial stability of food.
12. Dehydration of foods.
13. Use of chemical preservatives in food.
14. Preservation of food by bottling (Fruit/Vegetable/meat).
15. Cut-out analysis of canned food.
16. Comparison of conventional and microwave processing of food.

BSND127-25: FOOD CHEMISTRY (LAB)

Course outcome: At the end of the course, the students will be able to

CO1	Prepare primary and secondary standard solutions accurately and apply principles of volumetric and analytical techniques in food analysis.
CO2	Determine proximate composition of foods by estimating moisture, crude fat, protein, and carbohydrate content using standard laboratory methods.
CO3	Understand physicochemical properties of fats, and oils including, refractive index, specific gravity, free fatty acids, and saponification value.
CO4	Describe quality parameters of fats and oils such as smoke point and fat absorption, and interpret their significance in food processing and stability.
CO5	Develop skills in handling laboratory instruments, maintaining accuracy and precision, and interpreting experimental data related to food chemistry.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	3	–	2	2	–
CO2	3	–	3	2	–
CO3	3	–	3	2	–
CO4	3	–	2	2	–
CO5	2	2	3	2	1

BSND127-25: FOOD CHEMISTRY (LAB)

Total Marks: 50

L	T	P
0	0	4

Course Content:

1. Preparation of primary and secondary solutions.
2. Estimation of moisture content.
3. Estimation of crude fat content by Soxhlet extraction method.
4. Estimation of protein content by Kjeldahl method.
5. Estimation of reducing and non-reducing sugars using potassium ferricyanide method.
6. Determination of the pasting temperature range of different starches and effect of additives on it.
7. Determination of refractive index and specific gravity of fats and oils.
8. Determination of percent free fatty acids.
9. Estimation of saponification value.
10. Determination of smoke point and percent fat absorption for different fats and oils.

EVS102-18: ENVIRONMENT STUDIES

Course outcome: At the end of the course, the students will be able to

CO1	Develop an understanding of the multidisciplinary nature, scope, and importance of environmental studies, including the principles of sustainability and sustainable development.
CO2	Explain the structure and functioning of ecosystems, energy flow, ecological succession, and analyze different types of ecosystems and natural resources.
CO3	Create awareness about biodiversity, its conservation strategies, ecosystem services, and the environmental challenges associated with resource depletion and habitat loss.
CO4	Examine the causes, effects, and control measures of environmental pollution, climate change, and other global environmental issues, along with relevant environmental laws and policies.
CO5	Encourage environmental responsibility through the study of human–environment interactions, environmental movements, disaster management, ethics, and field-based learning experiences.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	2	1	2	3	2
CO2	3	–	2	2	1
CO3	2	2	2	3	3
CO4	2	2	3	3	2
CO5	1	3	2	2	3

EVS102-18: ENVIRONMENT STUDIES

Total Marks: 100	L	T	P
	2	0	0

UNIT- I

Introduction to environmental studies

- Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.

UNIT- II

Ecosystems

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems:
    a) Forest ecosystem
    b) Grassland ecosystem
    c) Desert ecosystem
    d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT- III

Natural Resources: Renewable and Non-renewable Resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

UNIT- IV

Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex- situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

UNIT- V

Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

UNIT- VI

Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

UNIT- VII

Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

UNIT- VIII: Field work

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

***Recommended readings*:**

1. Sengupta, R. 2003. *Ecology and economics*: An approach to sustainable development. OUP.
2. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. *Ecology, Environmental Science and Conservation*. S. Chand Publishing, New Delhi.
3. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. *Conservation Biology*: *Voices from the Tropics*. John Wiley & Sons.
4. Thapar, V. 1998. *Land of the Tiger*: *A Natural History of the Indian Subcontinent*.
5. Carson, R. 2002. *Silent Spring*. Houghton Mifflin Harcourt.
6. Gadgil, M., & Guha, R.1993. *This Fissured Land: An Ecological History of India*. Univ. of California Press.
7. Gleeson, B. and Low, N. (eds.) 1999.*Global Ethics and Environment*, London, Routledge.
8. Gleick, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press
9. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. *Principles of Conservation Biology*. Sunderland: Sinauer Associates, 2006.
10. McCully, P. 1996. *Rivers no more: the environmental effects of dams* (pp. 29-64). Zed Books.
11. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
12. Odum, E.P., Odum, H.T. & Andrews, J. 1971.*Fundamentals of Ecology*. Philadelphia: Saunders.
13. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
14. Rao, M.N. & Datta, A.K. 1987. *Waste Water Treatment*. Oxford and IBH Publishing Co. Pvt. Ltd.
15. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.*Environment*. 8th edition. John Wiley & Sons.
16. Rosencranz, A., Divan, S., & Noble, M. L. 2001. *Environmental law and policy in India*. *Tripathi 1992*.
17. Warren, C. E. 1971. *Biology and Water Pollution Control*. WB Saunders.
18. Wilson, E. O. 2006.*The Creation: An appeal to save life on earth*. New York: Norton.

BSND128-25: BASICS OF COMPUTERS

Course outcome: At the end of the course, the students will be able to

CO1	Explain basic computer fundamentals including data and information concepts, components of a computer system, hardware elements, generations of computers, and input/output devices.
CO2	Describe software concepts, types of software, programming language classifications, operating system functions, and perform basic file and folder management using Windows OS.
CO3	Demonstrate practical skills in using MS Office applications including document creation in Word, basic calculations in Excel, and preparation of presentations in PowerPoint.
CO4	Explain the basic concepts and applications of emerging technologies such as Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT), cloud computing, and cybersecurity.
CO5	Apply fundamental computer knowledge and digital skills for academic, professional, and everyday problem-solving tasks.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	2	1	1	2	1
CO2	2	1	2	3	1
CO3	2	1	2	3	2
CO4	1	1	2	3	2
CO5	2	1	2	3	3

BSND128-25: BASICS OF COMPUTERS

Total Marks: 50	L	T	P
	2	0	0

UNIT-I

Computer Fundamentals – Theory - Meaning of Data and Information; Information Processing Concepts; Need, Quality and Value of Information; Data Processing Concepts

Elements of a Computer System – Definition, classification, characteristics, limitations of Computers

Basic Hardware Concepts – Components of a Computer System (CPU, ALU, Control Unit, Memory); Generations of Computers (Overview); Primary and Secondary Storage Devices; Input Devices (Keyboard, Mouse, Scanner, etc.); Output Devices (Monitor, Printer, Speakers, etc.)

UNIT- II

Software Concepts − Meaning and Types of Software, System Software and Application Software, Language Classification (Machine, Assembly, High-Level Languages), Basic Concept of Compilers and Interpreters

Operating System − Meaning and Functions of Operating System, Basics of Internal and External Commands, File and Folder Management

Introduction to Windows Operating System – Graphical User Interface (GUI) Features, Parts of a Typical Window and their Functions, Basic Windows Operations

UNIT- III

MS Office: Introduction to Microsoft Office – Basics, MS Office components, and uses.

Word Processing (Microsoft Word) - Creating and Editing Documents, Formatting Text and Paragraphs, Tables and Printing.

Spreadsheets (Microsoft Excel) − Workbook and Worksheet Basics, Simple Formulas and Functions.

Microsoft PowerPoint − Creating Simple Presentations, Slide Layout and Design, Basic Animations and Slide Show

UNIT- IV

Emerging technologies: Introduction to Artificial Intelligence (AI) – Meaning and definition, applications of AI, Machine Learning (ML) basics, AI in daily life. Introduction to Internet of Things (IoT) – Basic concept, smart devices and sensors, IoT application. Basic awareness – Cloud computing, cybersecurity

Recommended Readings:

1. Fundamentals of Computers, Prentice Hall India
2. Mastering Microsoft Office, Lonnie. E. Moseley, BPB Publications

BSND129-25: MENTORING AND PROFESSIONAL DEVELOPMENT

Course outcome: At the end of the course, the students will be able to

CO1	Develop overall personality traits including self-confidence, leadership qualities, teamwork, and professional ethics through structured class and outdoor activities.
CO2	Enhance technical and general aptitude skills through participation in aptitude tests, quizzes, expert lectures, and analytical discussions.
CO3	Improve communication and presentation skills through group discussions, student presentations, and interactive learning sessions.
CO4	Demonstrate general awareness of current affairs and professional trends through active engagement in quizzes, discussions, and knowledge-sharing activities.
CO5	Participate effectively in sports, NSS/NCC, and professional society or club activities to foster social responsibility, collaboration, and holistic professional development.

Mapping of Course Outcomes with Program Outcomes: Formulation of Course Outcomes-Program Outcomes matrix with correlation values as 1 (Low), 2 (Medium), 3 (High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	1	3	1	1	3
CO2	1	2	3	1	2
CO3	1	3	2	1	2
CO4	1	2	2	1	3
CO5	1	3	1	1	3

BSND129-25: MENTORING AND PROFESSIONAL DEVELOPMENT

Total Marks: 25

L	T	P
1	0	0

Details of the Course Content - Mentoring and Professional Development:

The course shall be split in two sections i.e. outdoor activities and class activities. For achieving the above, suggestive list of activities to be conducted are:

Practical no.	Contents	Contact Hours
	Part – A (Class Activities)	14
1	Expert and video lectures	
2	Aptitude Test	
3	Group Discussion	
4	Quiz (General/Technical)	
5	Presentations by the students	
6	Team building Exercises	
	Part – B (Outdoor Activities)	
1	Sports/NSS/NCC	
2	Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc	

The evaluation shall be based on rubrics for Part – A & B Mentors/Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.