## Faculty of Science

# Curriculum Structure and Syllabus

**(WEF 2026-27 Onwards)**

**As per**

# NEP 2020

**Apprenticeship Embedded Degree Course (AEDP)**

# B.Sc. in Nutrition, Dietetics and Food Technology

**Prof. Rajendra Singh (Rajju Bhaiya) University, Prayagraj**

# Prof. Rajendra Singh (Rajju Bhaiya) University, Prayagraj

## Program Structure for "B.Sc. in Nutrition, Dietetics and Food Technology" (2026-27 onwards)

| Year | Sem | Course Code | Course Name | Core/ Elective | Credit | Total Marks=100 | |
|---|---|---|---|---|---|---|---|
| | | | | | | CIE | ETE |
| I | I | **B260101T** | **Fundamentals of Human Anatomy and Physiology** | Major (Core)/ Theory | **3** | 25 | 75 |
| | | **B260102P** | **Practicum in Human Anatomy and Physiology** | Major (Core)/ Practical | **1** | 25 | 75 |
| | | **B260103T** | **Fundamentals of Nutrition** | Major (Core)/ Theory | **2** | 25 | 75 |
| | | **B260104P** | **Practicum in Nutrition** | Major (Core)/ Practical | **1** | 25 | 75 |
| | | **B260105T** | **Fundamentals of Food Science** | Major (Core)/ Theory | **2** | 25 | 75 |
| | | **B260106P** | **Practicum in Food Science** | Major (Core)/ Practical | **1** | 25 | 75 |
| | | **B260107T** | **Computer Applications and Digital Literacy for Nutrition and Health** | Minor (Elective) / Theory | **2** | 25 | 75 |
| | | **B260108P** | **Practicum in Computer Applications for Nutrition and Health** | Minor (Elective) / Practical | **1** | 25 | 75 |
| | | **B260109T** | **Fundamentals of Nutritional Immunology** | Minor (Elective)/ Theory | **2** | 25 | 75 |
| | | | **Vocational/ Skill Enhancement Course (Select Any One)** | SEC Elective | **3** | - | 100 |
| | | | **Value Added Course (Select any one):**<br>(1). **Understanding India**<br>(2). **Environmental Studies** | VAC Elective | **2** | 25 | 75 |

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# Syllabus

## B.Sc. in Nutrition, Dietetics and Food Technology

**Semester-1 (20 Credits)**

### Course I-Fundamentals of Human Anatomy and Physiology

**Credits: 3**
**Total Teaching Hours: 45 Hours**

**Course Outcomes-**

Students will be able to:
-Describe the basic organization of the human body.
-Explain the structure and functions of major organ systems.
-Understand fundamental physiological processes.
-Explain the role of homeostasis in maintaining normal body functions.

**Unit I: Basics of Human Anatomy and Physiology (7 Hours)**

-Definition, scope and importance of anatomy and physiology.
-Levels of organization of the human body; Anatomical terminology, planes and body cavities.
-Cell structure and functions; basic tissues.

**Unit II: Skeletal and Muscular Systems (8 Hours)**

-Structure and functions of the skeletal system.
-Classification of bones and joints.
-Axial and appendicular skeleton.
-Types of muscles and their functions.
-Basic mechanism of muscle contraction.

**Unit III: Blood, Cardiovascular and Respiratory Systems (8 Hours)**

-Composition and functions of blood; blood groups.
-Structure and functions of the heart and blood vessels; Pulmonary and systemic circulation.
-Structure and functions of the respiratory system; Mechanism of breathing and gaseous exchange.

**Unit IV: Digestive, Excretory and Nervous Systems (7 Hours)**

-Structure and functions of the digestive system; digestion and absorption.
-Structure and functions of the urinary system; urine formation.
-Organisation of the nervous system; structure and functions of the brain, spinal cord and neurons.

**References:**

Tortora, G. J. and Derrickson, B. Principles of Anatomy and Physiology. Wiley.
Waugh, A. and Grant, A. Ross & Wilson Anatomy and Physiology in Health and Illness. Elsevier.
Hindi Books
Singh, Brinda. मानव शरीर एवं क्रिया विज्ञान (Maanav Sharir Evam Kriya Vigyan). Panchsheel Prakashan.
Gupta, Anant Prakash. मानव शरीर रचना एवं क्रिया विज्ञान. Sumit Prakashan.

## Course II: Practicum in Human Anatomy and Physiology

**Credits: 1**
**Total Practical Hours: 30 Hours**

### Course Outcomes-

After completing the practical course, students will be able to:
-Identify Anatomical Structures: Identify major human organs, bones, tissues and organ systems using models, charts and laboratory specimens.
-Perform Basic Physiological Measurements: Demonstrate basic procedures for measuring pulse rate, blood pressure, respiratory rate, body temperature.
-Interpret Basic Physiological Parameters: Record and interpret basic physiological measurements and relate them to normal body functions.

### Unit I: Human Anatomy and Anatomical Studies

-Study of the compound microscope and its uses.
-Identification of basic human tissues using charts, models or slides.
-Study of the human skeletal system and identification of major bones.
-Study of major organs of the human body using charts and models.
-Study of the structure of the heart, lungs, kidneys and digestive system.

### Unit II: Basic Human Physiology

-Measurement of pulse rate and blood pressure.
-Determination of respiratory rate.
-Determination of blood groups (demonstration).
-Estimation of haemoglobin (demonstration).
-Measurement of body temperature

### References:

Manz, C. (2024). Fundamentals of Human Anatomy Laboratory Manual. Iowa State University Digital Press.
Marieb, E. N. and Smith, L. A. Human Anatomy & Physiology Laboratory Manual. Pearson.
Singh, Brinda. मानव शरीर एवं क्रिया विज्ञान. पंचशील प्रकाशन।
Kalra, Mahi. मानव शरीर रचना एवं क्रिया विज्ञान. वर्धन पब्लिशर्स।

## Course III: Fundamentals of Nutrition

**Credits: 2**
**Total Teaching Hours: 30 Hours**

### Course Outcomes

Students will be able to:
-Explain the basic concepts and importance of nutrition.
-Identify the sources, functions and deficiency disorders of nutrients.
-Describe the processes of digestion, absorption and energy metabolism.
-Apply basic principles of balanced diet, meal planning and nutritional assessment

### Unit I: Introduction to Nutrition (7 Hours)

-Definition, scope and importance of nutrition.
-Classification, sources and functions of nutrients.
-Balanced diet and factors affecting nutritional requirements.

### Unit II: Vitamins and Minerals (8 Hours)

-Sources, functions and deficiency disorders of vitamins.
-Major and trace minerals: sources, functions and deficiencies.
-Importance of water and dietary fibre.

### Unit III: Basic Knowledge of Carbohydrates, Proteins and Fats (8 Hours)

-Definition, classification, sources and functions of carbohydrates, proteins and fats.
-Digestion and absorption of carbohydrates, proteins and fats.
-Energy value and nutritional importance of macronutrients.
-BMR and energy requirements

### Unit IV: Nutritional Requirements and Assessment (7 Hours)

-Principles of meal planning and dietary guidelines.
-Dietary Reference Intakes (DRI), Estimated Average Requirement (EAR), Tolerable Upper Intake Level (UL) and Recommended Dietary Allowance (RDA).
-Malnutrition: undernutrition and overnutrition.

### References:

Srilakshmi, B. Nutrition Science. New Age International Publishers.
Whitney, E. and Rolfes, S. R. Understanding Nutrition. Cengage Learning.
Hindi References
Singh, Brinda. आहार विज्ञान एवं पोषण (Aahar Vigyan Evam Poshan). पंचशील प्रकाशन।
Singh, Nitu and Jindal ,S.आहार पोषण एवं स्वच्छता .साहित्य प्रकाशन ,आगरा .

## Course IV: Practicum in Nutrition

**Credits: 1**
**Total Practical Hours: 30 Hours**

### Course Outcomes-

After completing the practical course, students will be able to:
-Identify Nutrient Sources: Identify major food sources of carbohydrates, proteins, fats, vitamins and minerals and perform basic qualitative tests for nutrients.
-Calculate Nutrient Content: Calculate the energy and nutrient content of foods and daily diets using standard food composition tables.
-Plan Balanced Diets: Prepare balanced meal plans for different age groups and compare nutrient intake with recommended dietary requirements.

### Unit I: Food Composition and Nutrient Analysis

-Identification of food sources of carbohydrates, proteins, fats, vitamins and minerals.
-Measurement of food portions and edible portion of foods.
-Study of food groups and balanced diet.
-Calculation of the nutritive value of common foods.

### Unit II: Meal Planning and Nutrient Calculation

-Principles of meal planning for different age groups.
-Planning a balanced diet using food groups.
-Calculation of the nutritive value of a daily diet and Comparison with Recommended Dietary Allowances (RDA).

### References:

Nielsen, S. S. Food Analysis Laboratory Manual. Springer.
Conforti, F. D. Food Selection and Preparation: A Laboratory Manual. Wiley-Blackwell.
Hindi References
सिंह, बृंदा. आहार विज्ञान एवं पोषण। पंचशील प्रकाशन।
सिंह नीतू .प्रायोगिक गृह विज्ञान . साहित्य प्रकाशन ,आगरा ।

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## Course V: Fundamentals of Food Science

**Credits: 2**
**Total Teaching Hours: 30 Hours**

### Course Outcomes

By the end of this course, students will be able to:
1. Identify the major components of food, including water, carbohydrates, proteins, and fats, and describe their basic properties.
2. Explain the causes of food spoilage, including microbial activity, exposure to air, and unsuitable storage temperatures.
3. Describe basic food preservation methods, such as refrigeration, freezing, drying, and heat treatment.
4. Identify changes in the colour, texture, flavour, and nutritional quality of food during cooking and processing.
5. Apply basic principles of food hygiene, safe handling, storage, and packaging to minimize contamination and spoilage.

### Unit I: Introduction to Food Science

- Meaning, scope, and importance of food science.
- Basic functions of food.
- Types and sources of food.
- Major food groups and their significance.

### Unit II: Food Composition

- Introduction to carbohydrates, proteins, and fats.
- Vitamins and minerals present in food.
- Water and its importance in food.
- Functions of nutrients in the human body.

### Unit III: Food Preparation and Cooking

- Meaning and importance of cooking.
- Basic methods of cooking: boiling, steaming, frying, and baking.
- Physical and chemical changes in food during cooking.
- Factors affecting food quality during cooking.

### Unit IV: Food Preservation and Storage

- Meaning and importance of food preservation.
- Basic methods of food preservation.
- Principles of proper food storage.
- Causes of food spoilage and basic methods of prevention.

## Course VI- Practicum in Food Science

**Credits: 1**
**Total Practical Hours: 30 Hours**

**Unit I: Basic Food Identification and Preparation**
- Identification of common food items and food groups.
- Identification of major nutrients in common foods.
- Study of different cooking methods.
- Preparation of simple food items using different cooking methods.

**Unit II: Food Preservation and Storage**
- Identification of perishable and non-perishable food items.
- Study of common food preservation methods.
- Demonstration of proper food storage practices.
- Preparation of a chart on food preservation and food safety.

*****Suggested Practical Record: Students shall maintain a practical record containing observations, food pictures, charts, and details of basic food preparation activities.

**References:**

Food Science — B. Srilakshmi. New Age International Publishers.
Food Science and Nutrition — Sunetra Roday. Oxford University Press.
आहार एवं पोषण विज्ञान — प्रमिला वर्मा एवं कांती पांडे।
आहार एवं पोषण विज्ञान — डॉ. वृंदा सिंह, पंचशील प्रकाशन।

## Course VII: Computer Applications and Digital Literacy for Nutrition and Health

**Credits: 2**
**Total Teaching Hours: 30 Hours**

### Course Outcomes

By the end of this course, students will be able to:
1. Use basic office applications to prepare reports, organize nutritional data in spreadsheets, and create presentations.
2. Use appropriate digital tools to record food intake and calculate basic dietary energy and nutrient values.
3. Search for reliable nutrition and health information using appropriate websites and digital resources.
4. Create basic digital posters, charts, and presentations to communicate nutrition and health information.
5. Demonstrate an understanding of internet safety, data privacy, and the secure handling of health-related information.

**Unit I: Introduction to Computers**
- Meaning and importance of computers.
- Basic components of a computer.
- Types of computers and their applications.
- Introduction to computer hardware and software.
- Applications of computers in nutrition and health.

**Unit II: Basic Computer Applications**
- Introduction to MS Word.
- Creating, editing, formatting, and saving documents.
- Preparing simple tables and lists.
- Introduction to MS Excel.
- Basic calculations and data entry using Excel.

**Unit III: Digital Literacy and the Internet**
- Introduction to the internet and web browsers.
- Use of search engines to retrieve information.
- Sending and receiving emails.
- Introduction to digital communication.
- Basic online safety and password protection.

**Unit IV: Digital Applications in Nutrition and Health**
- Searching for nutrition and health information online.

- Introduction to reliable nutrition and health websites.
- Use of digital tools for maintaining food and health records.
- Preparation of simple diet charts using computers.
- Introduction to online health services and digital health records.
- Basic principles of data privacy and secure handling of health information.

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## Course VIII: Practicum in Computer Applications for Nutrition and Health

**Credits: 1**
**Total Practical Hours: 30 Hours**

### Unit I: Basic Computer Skills

- Identification of the basic components of a computer.
- Creating and saving a document in MS Word.
- Typing and formatting a simple paragraph.
- Preparing a table in MS Word.
- Performing basic calculations in MS Excel.
- Preparing a basic food and nutrition table.

### Unit II: Digital Applications in Nutrition and Health

- Searching for nutrition and health information online.
- Creating and sending an email.
- Preparing a simple diet chart using MS Word or MS Excel.
- Preparing a daily food intake record.
- Creating a chart illustrating the major food groups using a computer.
- Identifying reliable nutrition and health websites.

### References:

Fundamentals of Computers — V. Rajaraman and Nirja Adabhal, PHI Learning.
Health Nursing Information and Technology — R. Srivani, Publisher-Jaypee Brothers Medical Publishers.
कंप्यूटर फंडामेंटल्स एवं एमएस ऑफिस — लेखक: डॉ. कमलेश धीवार, प्रकाशक: शाश्वत पब्लिकेशन

# Course IX: Fundamentals of Nutritional Immunology

**Credits: 2**
**Total Teaching Hours: 30 Hours**

## Course Outcomes

After completing this course, students will be able to:
1-Explain the basic concepts and types of immunity.
2-Identify the components and functions of the immune system.
3-Describe the role of nutrients in immunity.
4-Understand the effects of malnutrition on immunity.
5-Explain the importance of a balanced diet in maintaining immune health.

### Unit I: Introduction to Immunology

-Meaning, definition and importance of immunity.
-Types of immunity: Innate and acquired; active and passive immunity.
-Components of the immune system: Organs, cells and antibodies.

### Unit II: Immune System and Its Functions

-Antigens and antibodies: Meaning and functions.
-Types of immune responses.
-Functions of the immune system.
-Factors affecting immunity.

### Unit III: Role of Nutrients in Immunity

-Relationship between nutrition and immunity.
-Role of carbohydrates, proteins and fats in immunity.
-Role of vitamins A, C, D, E and B-complex.
-Role of minerals: Iron, zinc and selenium.

### Unit IV: Nutrition and Immune Health

-Effects of malnutrition on immunity.
-Gut health and immune function.
-Role of probiotics and prebiotics.
-Dietary approaches to improve immunity.

## Practical: Fundamentals of Nutritional Immunology

### Unit I: Nutritional Assessment

-Assessment of nutritional status using BMI.
-Identification of nutrient-rich foods supporting immunity.

-Preparation of a balanced diet plan for immune health.

**Unit II: Food and Immune Health**

-Preparation of probiotic-rich foods.
-Identification of food sources of vitamins and minerals important for immunity.
-Preparation of a chart showing the relationship between nutrients and immunity.

**References:**

Gershwin, M. E., German, J. B., & Keen, C. L. (2000). Nutrition and Immunology: Principles and Practice. Humana Press.
2. Gershwin, M. E., Nestel, P., & Keen, C. L. (2004). Handbook of Nutrition and Immunity. Humana Press.
3. Calder, P. C., & Yaqoob, P. (2013). Diet, Immunity and Inflammation. Woodhead Publishing.
4. Chandra, R. K. Nutrition and Immunology. Alan R. Liss.
5. Calder, P. C. Nutrition, Immunity and COVID-19. BMJ Nutrition, Prevention & Health.