

## POOL OF GENERIC ELECTIVES

### GENERIC ELECTIVE COURSE - (GE-5) NUTRITION AND FOOD SCIENCE

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Nutrition and Food Science (BCH-GE-5)	04	02	0	02	Class XII with Science	NIL

#### Learning Objectives

The course aims to provide the basic knowledge of food and its importance in nutrition. The students will understand the importance of a balanced diet and the association of life style disorders with unhealthy food eating habits. They will be able to understand the concept of under and over nutrition and the deficiency diseases that result due to deficiency of micronutrients in diet.

#### Learning outcomes

On successful completion of the course students will be able to:

- Describe the importance of food in our life
- Explain how food is spoiled and learn about some common food borne diseases/ food allergies
- Elaborate the functions of macro and micronutrients in our body
- Apply the knowledge gained to rationalize the diseases associated with malnutrition/ overnutrition and deficiency diseases

### BCH-GE-5 : NUTRITION AND FOOD SCIENCE SEMESTER – V

#### 2.2 Course Contents

Theory

Credits: 2

Total Hours: 30

#### Unit 1 –Basics of Food Science and Nutrition

(10 Hours)

Definition of Food, Nutrition, Nutrient, Nutritional status

Energy value of foods, determination, physiological fuel values, SDA of foods, BMR & RMR, factors influencing BMR. Recommended allowance-RDA for Indians, basis for requirement, energy allowance for different growth pattern of children, energy allowance for various activities and different age groups. Balanced diet, fad diets

## **Unit 2– Macronutrients (10 Hours)**

Introduction to macronutrients and their function, digestion, absorption and assimilation of carbohydrates, lipids and proteins, Glycemic response and glycemic index of foods, dietary fiber- types, properties, sources and its role, importance of essential fatty acids, their requirements and deficiency, role & nutritional significance of PUFA, MUFA, SFA, omega-3/omega 6 fatty acid, essential amino acids, dietary protein quality- PER, NPU, BV, chemical score and PDCAAS. Factors affecting protein bio-availability including anti-nutritional factors, protein toxicity, amino acid complementation and Supplementation in foods

## **Unit 3 – Micronutrients (10 Hours)**

Fat soluble vitamins: Sources, physiological importance and deficiency diseases. Water soluble vitamins: Sources, physiological importance and deficiency diseases. Minerals: Sources, physiological importance and diseases due to excess or deficiency of Ca, P, Na, K, Fe, Zn, S, Mg, Se, Cu.

## **Unit 4 – Food and Health (5 Hours)**

Food as medicine: medicinal value of functional foods such as garlic, ginger, turmeric, tulsi, fenugreek, ajwain, aloe vera, moringa, role of Gut microbiome in maintaining health, pre and probiotics, various types of food additives: emulsifiers, preservatives and food colors, benefits and risks associated with these, food allergies, food spoilage, food poisoning, food borne diseases, Cholera, Hepatitis, Typhoid, Botulism

### **2.3 Practicals**

**Credits: 2**

**Total Hours:60**

1. Analysis of food labels for the presence of nutrients and other additives.
2. Estimation of carbohydrate content in food
3. Degree of unsaturation of any three different oils using Bromine test
4. Acid value / peroxide value of oil
5. Estimation of vitamin E / vitamin C in food
6. Morphological identification of important yeast and mold in foods (slides and culture)-
7. Assessment of diet chart for the presence/absence of nutrients
8. Case studies: PEM (Marasmus and Kwashiorkor), Diabetes, Obesity, Vitamin and mineral deficiency

### **2.4 Essential readings:**

1. Mahan, L.K., Strings, S. E., Raymond, J. (2012) *Krause's Food and Nutrition Care process*. Elsevier's Publications. ISBN: 978-1-4377-2233-8.

2. Rosalind Gibson (2005). *Principles of Nutritional Assessment*. Oxford University Press. ISBN: 978019517169
3. Nelson, D.L., Cox, M.M. (2017). *Lehninger: Principles of Biochemistry* (7<sup>th</sup> ed.). New York, WH: Freeman and Company. ISBN13: 9781464126116, ISBN10: 1464126119
4. Vasudevan, D.M., & Das, K.S. (2020). *Practical textbook of biochemistry for medical students* (3<sup>rd</sup> ed.). Jaypee Brothers Medical

### **Suggested readings:**

1. Practical Biochemistry, Damodaran Geetha K, Jaypee Brothers Medical Publishers Private Limited; 1<sup>st</sup> edition (1 January 2011), ISBN: 9789350251416, 9789350251416
2. Plummer, D.T. (1998) *An Introduction to Practical Biochemistry* (3<sup>rd</sup> ed.), Tata McGraw Hill Education Pvt. Ltd. (New Delhi); ISBN: 13: 978-0-07-099487-4 / ISBN:10: 0-07-099487-0.
3. Malik, D., Narayanasamy, N., Vavilala, P., Takur, J., Sinha, N., (2022). *Textbook of Nutritional Biochemistry*. Springer Singapore, ISBN978-981-19-4149-8.
4. Coombs Jr. G.F., (2008). *The vitamins, Fundamental aspects in Nutrition and Health*. Elsevier's Publications. ISBN-13- 978-0-12- 183493-7.
5. Devlin, T. M., (2011). *Textbook of Biochemistry with Clinical Correlations*. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.

### **3. Keywords:**

Food, Nutrition, macronutrients, micronutrients, food as medicine, food spoilage, food allergies

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

**GENERIC ELECTIVE COURSE - (GE-6)  
PHYSIOLOGY AND SPORTS AND EXERCISE**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Physiology of Sports and Exercise (BCH-GE-6)	04	02	0	02	Class XII with Science	Basic course on human physiology

**Learning Objectives**

To learn the changes in human body systems due to exercise and sporting activities in an integrated manner. To gain knowledge about sports training. Understanding the basic system physiology in sports. To understand the physiological adaptation and metabolic changes during exercise at varying intensities. To gain skill in measurement of various physiological responses.

**Learning outcomes**

On successful completion of the course students will be able to:

- Explain the effect of exercise in detail and in application perspective.
- Measure the changes and interpret them in the context of sports.
- Describe the system concepts behind sports performance.
- Explain human body functioning during exercise and thus provide appropriate nutrition/fuel.

**BCH-GE-6 : PHYSIOLOGY OF SPORTS AND EXERCISE  
SEMESTER - V**

**2.2 Course Contents**

**Theory**

**Credits: 2**

**Total Hours : 30**

**Unit I: Introduction to Exercise Physiology**

**(Total Hours: 4)**

Structure, types and Function of Skeletal Muscle. Fuel for Exercise: Aerobic and anaerobic muscle metabolism, Muscle Fatigue.

**Unit II: Cardiovascular and Pulmonary control in Sports Performance**

**(Total Hours : 10)**

Heart rate and Blood Pressure. Electrophysiology of Heart, Introduction and interpretation of EKG/ECG, Pacemakers and its Rhythms. Mechanics of ventilation during exercise. Cardiorespiratory Responses to physical activities. Training of cardiorespiratory responses in different types of physical activities for maximising output.

**Unit III: Hormonal Effects on Physical Activities**

**(Total Hours: 8)**

Role of epinephrine, cortisol, sex hormones, growth hormones and growth factors on physical endurance. Effect of aging on Sport performance.

**Unit IV: Drugs and Doping in Sports**

**(Total Hours : 8)**

History and evolution of Doping and Anti-doping in Sports, Prevalence of Doping in Sports, Doping Control in Sports, Role of Athlete Support Personnel in Preventing Deliberate and Inadvertent Use of Prohibited Substances, WADA Rules and Regulations.

**2.3 Practical:**

**Credits: 2**

**Total Hours: 60**

1. BMI Estimation with and without software - Techniques of taking various anthropometric measurements; Skinfold measurement and Body Fat Percentage calculations.
2. Aerobic Power Field Assessments; Cooper 1.5-Mile Run/Walk Test and 12-Minute Run/Walk Test/Rockport Fitness Walking Test.
3. Tests for anaerobic power; Wingate Test/Anaerobic Cycling Power
4. High-Intensity Fitness Testing/ AAHPER health related physical fitness test Léger 20 m Shuttle Run Test/ Margaria - Kalamen Stair Climb Test,
5. Pulmonary Function Testing: Ratio of Forced expiratory volume (FEV1/FEV6) by spirometry, Lung Volumes and Capacities
6. Determination of age by Radiography (Dry lab)
7. Blood Pressure Measurements: Effects of Body Position, Dynamic Exercise and Isometric Contractions on BP.

8. Determination of Physiological adaptation with training through Submaximal Exercise Testing; Submaximal Bench Step Test/Submaximal Cycle Ergometer Test

#### **2.4 Essential readings:**

1. Physiology of Sport and Exercise 6<sup>th</sup> Edition with Web Study Guide-Loose-Leaf Edition by W. Larry Kenney, Jack Wilmore, David Costill.
2. Endocrinology of Physical Activity and Sport, Second Edition Constantini, Naama, Hackney, Anthony C, 2013.
3. David R. Mottram, Neil Chester (2018) Drugs in Sports, Routledge, ISBN:1351838989. Portefield, Jason (2008) Doping: athletes and drugs, Rosenn Publishing, New York, ISBN:1-4042-1917-5.
4. Laboratory Manual for Exercise Physiology 2<sup>nd</sup> Edition. With Web Study Guide, Human Kinetics by G. Gregory Haff, Charles Dumke, 2018.
5. Physiological Tests for Elite Athletes 2<sup>nd</sup> Edition by Australian Institute of Sport Rebecca Tanner, Christopher Gore, 2012.

#### **Suggested readings:**

1. A Textbook of Sports & Exercise Physiology by Dey Swapan Kumar, Jaypee Publishers
2. Exercise Physiology: Theory and Application to Fitness and Performance 10<sup>th</sup> Edition by Scott Powers and Edward Howley 2018.
3. Exercise Physiology: Nutrition, Energy, and Human Performance 8<sup>th</sup> Edition by William D. McArdle, Frank I. Katch, Victor L. Katch
4. Practical ECG for Exercise Science and Sports Medicine by Greg Whyte, Sanjay Sharma, Human Kinetics, 2010
5. ACSM's Guidelines for Exercise Testing and Prescription, 10<sup>th</sup> Edition by American College of Sports Medicine. Wolters Kluwer, 2017.

#### **3. Keywords**

Muscle metabolism, Muscle Fatigue, Cardiorespiratory Responses, Sport performance, Prohibited Substances

**Note:** Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

**GENERIC ELECTIVES COURSE - (GE-10)**  
**INTERMEDIARY METABOLISM**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
<b>INTERMEDIARY METABOLISM (BCH-GE-10)</b>	<b>04</b>	<b>02</b>	<b>0</b>	<b>02</b>	<b>Class XII with Science and Biology</b>	<b>Basic courses allied to biological sciences</b>

**Learning Objectives**

The course aims to familiarise the learner with the pathways of fuel and energy metabolism with an emphasis on their interrelationship and integrated regulation.

**Learning outcomes**

On successful completion of the course learners will be able to:

1. Discuss the underpinnings of fuel metabolism
2. Describe the mechanism of ATP synthesis.
3. Discuss the biosynthesis and degradation pathways.
4. Evaluate the interrelationships of carbohydrate and lipid metabolism
5. Discuss the biosynthesis and degradation of amino acids and nucleotides
6. Correlate the integration of metabolism

**SYLLABUS OF GE-10**

**BCH-GE-10 : INTERMEDIARY METABOLISM  
SEMESTER - V**

**2.2 Course Contents**

**Theory (Credit 2)**

**Total Hours : 30**

**Unit I: Carbohydrate metabolism**

**(14 Hours)**

Glycolysis as a universal pathway, anaerobic glycolysis, fermentation, gluconeogenesis, reciprocal regulation of glycolysis and gluconeogenesis, Pentose phosphate pathway, Pyruvate dehydrogenase complex, oxidation of acetyl CoA. TCA cycle, amphibolic role, ATP calculation, Glycerol-3-phosphate and malate-aspartate shuttle.

**Unit II: Fatty acid catabolism**

**(6 Hours)**

TAG as energy source,  $\beta$  oxidation of saturated fatty acids in mitochondria, Fatty acid activation and overview of regulation, formation of ketone bodies and metabolism

**Unit III: Amino acid and nucleotide metabolism (6 Hours)**

Transamination, Deamination, urea cycle and its regulation, Glucose-alanine cycle, Krebs bicycle, Nucleotide Biosynthesis - salvage pathways, Degradation.

**Unit IV Integration of metabolism (4 Hours)**

Metabolic shifts in absorptive, post absorptive, fasting and starvation states.

**2.3 Practical:**

**Credits: 2**

**Total Hours : 60**

1. Estimation of blood glucose by GOD-POD method
2. Demonstration of alcohol fermentation by yeast.
3. Estimation of serum cholesterol.
4. Estimation of serum TAGs.
5. Estimation of urea in serum
6. Estimation of uric acid in serum

**2.4 Essential readings:**

1. Nelson, D.L. and Cox, M.M. (2017). Lehninger: Principles of Biochemistry (7<sup>th</sup> ed.). W.H. Freeman & Company (New York), ISBN:13: 9781464126116 / ISBN:10-1464126119.
2. Berg, J.M., Tymoczko, J.L., Stryer L., (2012) Biochemistry 7<sup>th</sup> ed., W.H. Freeman and Company (New York); ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4.
3. Campbell, M.K., Farrel, S.O. (2012) Biochemistry 7<sup>th</sup> ed, S.O. Brooks/Cole, Cengage Learning (Boston); ISBN: 13:978-1-111-42564-7 ISBN:10:1-4292-2936-5.
4. An Introduction to Practical Biochemistry (1998) 3<sup>rd</sup> ed., Plummer D. T., Tata McGraw Hill Education Pvt. Ltd. (New Delhi), ISBN:13: 978-0-07-099487-4 / ISBN:10:0-07-099487-0.

**Suggested Readings:**

1. Principles of Biochemistry (2013) 4<sup>th</sup> ed., Voet, Donald, Voet, Judith &Pratt, charlotte. Wiley & Sons, Inc. (New Jersey), ISBN:978-1-11809244-6.

**3. Keywords**

Catabolism, anabolism, Glycolysis, TCA, Glycogen metabolism, Gluconeogenesis, nucleotide metabolism, beta oxidation, salvage pathway and integration

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**