AC 10/2/2012
Item No. 4.46

UNIVERSITY OF MUMBAI

Syllabus
SEMESTER I & SEMESTER II
Program: M.Sc.
Course: Home Science
Branch IC: Sports Nutrition
(Self Financing Course)

(Credit Based Semester and Grading System with effect from the academic year 2012–2013)

SEMESTER I

Course Code	Title	Credits	Periods	Marks
PSHSIC101	Research Methods and Statistics	4	4	100
PSHSIC102	Exercise Physiology	4	4	100
PSHSIC103	Nutritional Biochemistry	4	4	100
PSHSIC104	Sports Nutrition	3	3	75
PSHSIC105	Nutrition through Life Cycle	3	3	75
PSHSPIC101	Exercise Physiology	3	3	75
PSHSPIC102	Assessment of Nutritional Fitness	3	3	75
		24	24	600

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC101	**Research Methods and Statistics**	**4**	**100**	**4**

RESEARCH METHODS AND STATISTICS

No. of Credits: 4

Objectives

1. To build in students appreciation for high quality research in each of their specialisations.
2. To introduce students to the skills needed in conducting a research in their specialisation.
3. To introduce students to principles of good scientific writing.
4. To enable in students the skills in selecting, computing, interpreting and reporting statistics.

Course Content		Lectures
UNIT I	**1 A. Introduction and Overview** (a) What is a research? (b) Objectivity and subjectivity in scientific inquiry: Premodernism, modernism, and postmodernism (c) Steps in the research process (d) Importance of research in general, and in each discipline (e) Illustration of research in each of the three specialisations: Foods, Nutrition, and Dietetics; Human Development; and, Textile and Fashion Technology (f) Qualitative versus quantitative research **1 B. The beginning steps in the research process** (a) Identifying broad areas of research in a discipline (b) Identifying interest areas; using multiple search strategies (c) Prioritising topics; specifying a topic; feasibility (d) Review of literature/scholarly argument in support of study (e) Specifying research objectives/hypotheses/questions	**15**
UNIT II	**2 A. Variables** (a) Definition (b) Characteristics (c) Types (d) Levels of measurement **2 B. Measurement** (a) Conceptual definitions and operational definitions (b) Types of validity and reliability in quantitative research **2 C. Data entry in quantitative research** (a) Codebook and mastersheet (b) Creating data files and data management	**15**
UNIT III	**3. A. Introduction and overview to statistics** (a) Role of statistics in (quantitative) research (b) Definition/changing conceptions (c) Prerequisite concepts in mathematics (e.g., properties of the summation sign, basic algebra) **3 B. Descriptive Statistics for summarizing ratio level variables** (a) Frequencies and percentages (b) Computing an average/measure of a central tendency Mean, median, mode(s) Contrasting the mean vs. median Computing an average when there are outliers or extreme values in the data set Robust measures of the center (5% trimmed mean; M estimators) Quartiles and percentiles	**15**

	(d) Computing a measure of variability or dispersion Why? (inadequacy of the mean) Minimum value and maximum value Range Interquartile range Variance and standard deviation (e) Discrete and continuous variables (f) Histograms and line graphs	
UNIT IV	**4 A. Descriptive Statistics for summarizing nominal, ordinal and interval level variables** **4 B. Demonstration of computer software such as the Statistical Package for the Social Sciences (SPSS)** (a) Data entry (b) Data Management (c) Descriptive Statistics **4. C. Probability: Foundation of Advanced/Inferential Statistics** (a) Definition (b) Role of probability in research and statistics (c) Elementary concepts in probability Sample space, experiment, event/outcome/element of the sample space Equally likely outcomes and the uniform probability model Stabilization of the relative frequency	**15**

References:

Bhattacharyya, G.K. & Johnson, R. A. (1977). *Statistical concepts and methods.* NY: John Wiley.

Dwiwedi, R. S. (1997). *Research methods in behavioral sciences.* Delhi: Macmillan India.

Gravetter, F. J. & Waillnau, L. B. (2000). *Statistics for the behavioral sciences.* Belmont, CA: Wadsworth/Thomson Learning.

Kerlinger, F. N. & Lee, H. B. (2000). *Foundations of behavioral research.* Orlando, Florida: Harcourt.

Leong, F.T.L. & Austin, J. T. (Eds.) (1996). *The psychology research handbook.* New Delhi: Sage.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC102	**Exercise Physiology**	**4**	**100**	**4**

EXERCISE PHYSIOLOGY

No. of Credits: 4

Objectives:

1. To impart knowledge on the physiological effects of exercise on human body composition.
2. To explain to the students the body compositional requirement for various athletic and sports categories.
3. To enable the students understand the role of exercise in fitness.
4. To enable the students understand the therapeutic benefits of exercise.

Course Content		Lectures
UNIT I	**Body composition** i. An overview of human body composition ii. Factors influencing body composition-age, sex, etc… with special emphasis on exercise.	**15**
UNIT II	**Body composition and sports performance** i. Effect or ergogenic aids on body composition of athletes ii. Physique and sports performance. **Muscle physiology** i. Structure, composition, types and functioning of muscles ii. Types of muscle exercise- endurance, resistance and flexibility; and their effect on the composition and strength of muscle.	**15**
UNIT III	**Muscle physiology** i. Effect of training on muscle ii. Exercise related muscle injuries iii. Adaptation to exercise causes and concerns iv. Markets of muscle fitness	**15**
UNIT IV	**Exercise & skeletal fitness** i. Bone physiology-structure of bone, bone formation and remodeling ii. Types of joints iii. Bone injuries during exercise training iv. Exercise and bone health	**15**

References

Davies, A, Blakeley, G. H. and Kidd, C. (2001) *Human Physiology*, Harcourt Pub., 1st ed. Edinburgh: Churchill Livingstone

Laboratory Manual, NIN

McArdle, W.D., Katch, F. L. & Katch, V.L. (1996) *Exercise Physiology*, (4th ed.), Williams & Wilkins, A Waverly Company

Rhodes, R. & P.Flouzer, R (2003) *Human Physiology*, Thomson Brooks & Cole, (4th Ed).

Tortora, G. J. and Grabowski, R. S. (1993) *Principles of Anatomy and Physiology*, (7th ed.).Harper Collins College Publishers.

Waugh, A. and Grant, A. (2006) *Anatomy and Physiology in Health and illness* Churchill Livingstone, 10th ed.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC103	**Nutritional Biochemistry**	**4**	**100**	**4**

NUTRITIONAL BIOCHEMISTRY

No. of Credits: 4

Objectives

At the completion of this course the student should be able to

1. Describe structure, functions and metabolism of macronutrients.
2. Describe hormonal and enzymatic modulators to the metabolism of macronutrients.
3. Describe the biochemistry and metabolism of the macronutrients during different physiological states.
4. List important micronutrients needed as cofactors involved in macronutrient metabolism.
5. Explain the metabolic inter relationship between macronutrients.
6. Have knowledge of current research on Nutrition, Metabolism and dietetics.

Course Content		Lectures
UNIT I	**Basic chemistry and classification of macromolecules** w.r.t. i. Carbohydrates ii. Proteins iii. Lipids **Digestion and absorption of macromolecules** w.r.t. i. Enzyme action and biochemical mechanism ii. Metabolism of macronutrients carbohydrates, EMP, TCA, Gluconeogenesis, HMP, Glycogen metabolism, Uronic acid pathway Metabolism of Fructose and Galactose	**15**
UNIT II	**Protein metabolism** i. Protein –Urea cycle ii. Glucose-Alanine Cycle iii. NH_3 transport iv. Biosynthesis of Glutathione v. Creatinine haem vi. Carnitine vii. Neurotransmitters **Lipid** i. Oxidation and biosynthesis of even C fatty acid ii. Cholesterol biosynthesis	**15**
UNIT III	**Body energy** i. Measurement of energy ii. Laws of thermodynamics iii. Redox reactions iv. Electron transport chain, ATP v. Mechanism of Oxidative Phosphorylation vi. Phosphogens	**15**
UNIT IV	**Chemistry of Nucleic Acids** i. DNA and types of DNA ii. RNA and types, structure and functions iii. DNA & RNA Metabolism iv. Transcription v. Translation vi. Protein biosynthesis vii. Regulation of gene expression, Nutrient gene interactions	**15**

References

Berg, J. M., Tynocrko, J. L. et al *Biochemistry* (5th ed.) New York W.H. Freeman and Co 2002.
Brody Tom. *Nutritional Biochemistry* 2nd ed. New Delhi Elsevier/Reed Elsevier India Pvt. Ltd. 2004
Chatterjee M.N. Shinde and Rana *Textbook of Medical Biochemistry* 6th ed. New Delhi Jaypee Brothers Medical Publishers 2005.
Devlin Thomas, M (ed.) *Textbook of Biochemistry with Clinical Correlation* New York, John Wiley and Sons Inc. 1997.
Montgomery, Rex and others *Biochemistry A case oriented Approach* St. Louis The C.V. Mosby Co. 1977.
Murray, R.K. and others. *Harper's Biochemistry* 25th ed. Connecticut, Appleton and large Publications. London Prentice Hall Int. Inc 1996.
Lehninger, A.L.; Nelson D.L. and Cox. M.M., *Principles o Biochemistry* 3rd ed. New York. Worth Publishers McMullan Press, 2000
Puri Dinesh *Textbook of Biochemistry*. A Clinically oriented Approach New Delhi B.I. Churchill Livingstone Pvt. Ltd. 2002.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC104	**Sports Nutrition**	**3**	**75**	**3**

SPORTS NUTRITION

No. of Credits: 3

Objectives

1. To gain the knowledge and understanding of nutrition required for exercise and sport in order to enhance performance.
2. To learn the role and significance of macro nutrients and micronutrients in achieving fitness.

Course content		**Lectures**
UNIT I	**Introduction to sports nutrition** i. Historical approaches to exercise and nutrition ii. Role of macronutrients **Carbohydrates** i. Overview of digestion, absorption and storage ii. Carbohydrate metabolism iii. Carbohydrate reserves iv. Measures for glycogen modulation. v. Factors affecting utilization of carbohydrates during exercise vi. Exercise intensity vii. Effect of training viii. Carbohydrate supplementation during exercise ix. Lactate production x. CHO requirements xi. Quality concerns	**15**
UNIT II	**Lipids and lipoproteins** i. Overview of digestion, absorption and storage. ii. Plasma lipids, lipoproteins and phospho-lipoproteins iii. Fat as a fuel iv. Fatty acid oxidation v. Strategies to improve fatty acid oxidation. vi. Physical training vii. Medium chain triglycerides viii. L-carnitine ix. Overall fat intake x. Plasma lipid/lipoprotein levels and chd risk.	**15**
UNIT III	**Influence of dietary factors on fat utilization.** i. Total fat intake ii. High carbohydrate diets iii. Dietary fibre iv. Alcohol **Influence of exercise** i. Type of exercise ii. Gender influence iii. Lipid metabolism iv. Weight loss	**15**

References

Bernadot dan (1999) *Nutrition for Serious Athletes*, Human Kinetics USA.

Brouns Fred and Caustan – Cargill (2002) *Essentials of Sports Nutrition* – 2nd edition John Wiley and Sons, England.

Burke Louse and Deakin Vicky (2006) *Clinical Sports Nutrition*, McGraw – Hill Pvt. Ltd. Australia.

Summerfield Lianne M (2001), *Nutrition Exercise and Behavior An integrated approach to weight management*, Belmount (USA). Wadsworth/Thompson Learning
Wolinksy Ira (1998) *Nutrition in Exercise and Sports* CRC press Boca Raton
Wolinksy Ira, Drishill Judy (1997) *Sports and Nutrition Vitamins and Trace elements*, CRC Press BY.
Wolinskoy Ira, Driskell J. (2004) *Nutritional Ergogenic Aids*, CRC Press NY.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC105	**Nutrition Through the Life Cycle**	**3**	**75**	**3**

NUTRITION THROUGH THE LIFE CYCLE

No. of Credits: 3

Objectives

1. To understand the changes in human body composition during different stages of life.
2. To study the influence of nutrition on man during the different stages of life cycle.
3. To be aware of, and update the knowledge in the field of nutrition as applied during the life cycle.

Course Content		Lectures
UNIT I	**Basics of Nutrition** Brief overview of functions, sources and deficiency of Macro and Micronutrients Balanced Diet **Nutrition during Pregnancy** a) Reproductive Physiology (Male and Female) b) Nutrition related disruptions in fertility (under and over nutrition) c) Physiology of pregnancy d) Effect of Nutritional Status on pregnancy outcome. e) Nutritional requirements and dietary guidelines f) Nutrition related complications g) Complications of pregnancy h) HIV/AIDS during pregnancy – Dietary concerns i) Role of Exercise & Fitness j) Adolescent Pregnancy	**15**
UNIT II	**Nutrition during lactation** a) Physiology of Lactation b) Human milk composition c) Nutritional requirements & dietary guidelines d) Benefits of Breast Feeding e) Galactogouges f) Lactation Management in Normal & Special conditions **Nutrition in infancy** a) Physiological development, Motor, Cognitive development. b) Energy and nutrient needs. c) Feeding in early and late infancy d) Development of infant feeding skills e) Common nutrition problems f) Feeding Preterm and low birth weight infants	**15**
UNIT III	**Nutrition in Toddlerhood and Preschool, Childhood & Preadolescent** a) Growth and development b) Nutritional requirements c) Nutrition for children with special health care needs d) Feeding problems e) Nutritional concerns and prevention of nutrition related disorders i. Obesity – underweight ii. Deficiency condition iii. Allergies, eating disorders	**15**

References

Bennion, H. (1979) *Clinical Nutrition*, New York Harper and Raw Publishers
Brown, J. E. (1998). *Nutrition Now*, West/Wadsworth: International Thomson Pub. Co.
Brown, J. E., Sugarman, I. J. (2002). *Nutrition through the Life Cycle*, Wadsworth Thomson Learning.

Donald, B., MCColmick,. Bier, D. M. (1997). *Annual Review of Nutrition* (vol. 19)
Goodhart, R. S. S. and Shils, M. E. (1998). *Modern Nutrition in Health and Disease*. Philadelphia: Lea and Febiger.
Groff, J. L and Gropper, S. S. (1999). *Advanced Nutrition and Human Metabolism*, Belmount CA: Wads worth/Thomson Learning.
Jackson, M. S., Rees, Jane, M., Golden, Neville, H.; Irwin Charles, E. (ed) (1997). *Adolescent Nutritional Disorders*. New York:The New York Academy of Science.
Lee, R. S. and Marcus, C. (1990) *Omega – 3Fatty Acids in Health and Disease*. – Marcel dekker Inc.
Mahan L. K. & Stump S.E. (11th ed.) (2004) *Krause's Food Nutrition and diet Therapy* – Saunders USA: Elsevier.
Wardlawy, G. M. Insel, P. M. and Seyler M. F. (1994). *Contemporary Nutrition; Issues and Insights* St. Lopuis Masby.
Warthington, R., Vermeersch J. and Willams, S. (1985). *Nutrition in Pregnancy and Lactation* St. Louis Times Mirror.Mosby College Publishing.
Ziegler, E. E. and Filer L. J. (1996). *Present Knowledge in Nutrition*, Washington D.C.: International Life Science institute.

Journals

Journal of American Dietetic Association USA – The American Dietetics Association.
Nutrition Reviews, New York Springton Verlog
The American – Journal of clinical Nutrition – USA Official Journal of the American Society for Clinical Nutrition Inc
The Indian Journal of Nutrition and Dietetics

Course Code	Title	Periods/week	Marks	Credits
PSHSPIC101	**Exercise Physiology**	**3**	**75**	**3**

EXERCISE PHYSIOLOGY

No. of Credits: 3

Objectives

1. To enable students understand the methods of assessing the physiological fitness.
2. To train the students in planning exercise and counseling strategies for special conditions – weight management, diabetes, CVD etc.

Course Content		Periods
UNIT I	Theoretical explanation and demonstration and assessment of cardio respiratory fitness	**15**
UNIT II	Theoretical explanation and demonstration of Cardio respiratory exercises (VO_2 Max)	**15**
UNIT III	Assessment of muscular fitness Muscle strength, endurance and flexibility exercises (Bench press, Jumps, Push ups, Sit and Reach Test)	**15**

Course Code	Title	Periods/week	Marks	Credits
PSHSPIC102	**Assessment of Nutritional Fitness**	**3**	**75**	**3**

ASSESSMENT OF NUTRITIONAL FITNESS

No. of Credits: 3

Objectives

1. To enable students understand the importance of biomarkers of nutritional status in the management of holistic fitness.
2. To help the students acquire practical skills in the biochemical assessment of nutritional status of individuals.

Course Content		Periods
UNIT I	**Assessment of protein nutriture** i. Estimation of serum Protein, Albumin and A: G Ratio (Biuret method) ii. Urinary creatinine/Height index, Urinary urea. iii. Evaluation of PEM in pediatric, adult, geriatric and sports persons. **Assessment of glucose tolerance** i. GTT ii. Estimation of fasting and postprandial blood glucose levels using kit methods.	**15**
UNIT II	**Biomarkers of vitamin status** i. Fat soluble vitamins: Vitamin A, Vitamin D, Vitamin E, Vitamin K a. Serum Retinol, Conjunctival Impression Cytology (CIC) and Dark Adaptation technique. b. Serum Alkaline Phosphatase, (Vitamin D) c. Serum Total tocopherol level and TBARS (Spectrophotometric analysis)	**15**
UNIT II	**Biomarkers of vitamin status** i. Water Soluble Vitamins a. Serum and Urinary Vitamin C (dye method) b. Microscopic examination of RBC for megaloblastic anaemia c. Microbiological assay for Vitamin B-12 and Folic acid.	**15**

References

Dandekar, S. P., Rane, S. A. (2004) *Practical and Viva in Medical Biochemistry*, New Delhi, Elsevier/Reed Elsevier India PVT LTD.

Godkar, P. B. (2003)*Textbook of Medical Laboratory Technology*, (2nd ed.), Mumbai, Bhalani Publishing House, Mumbai

Sadasivan , S. & Manickam, A, (2003) *Biochemical Methods*, (2nd ed.), New age International Pvt. Ltd.

Sauberlich, H. E. (1999) *Laboratory tests for the Assessment of Nutritional Status*, (2nd ed.)., CRC press Laboratory Manual, NIN.

SEMESTER II

Course Code	Title	Credits	Periods	Marks
PSHSIC201	Research Methods and Statistics	4	4	100
PSHSIC202	Exercise Physiology	4	4	100
PSHSIC203	Nutritional Biochemistry	4	4	100
PSHSIC204	Sports Nutrition	3	3	75
PSHSIC205	Nutrition through Life Cycle	3	3	75
PSHSPIC201	Exercise Physiology	3	3	75
PSHSPIC202	Assessment of Nutritional Fitness	3	3	75
		24	24	600

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC201	**Research Methods and Statistics II**	**4**	**100**	**4**

RESEARCH METHODS AND STATISTICS

No. of Credits: 4

Objectives

1. To help students develop the skills needed in conducting a research in their specialisation.
2. To promote academic, research and professional ethics in students.
3. To introduce students to principles of good scientific writing.
4. To enable in students the skills in selecting, computing, interpreting and reporting statistics.

Course Content		Lectures
UNIT I	**1 A. Sampling techniques in quantitative research** (a) Sampling methods in current use/examples from current research (b) Issues with regard to sampling techniques **I B. Research designs in quantitative research** Distinguishing between the following research designs; and, selecting research designs that are congruent with one's research purpose. (a) Longitudinal versus cross-sectional (b) Experimental versus quasi-experimental versus correlational (c) Exploratory versus descriptive versus explanatory	**15**
UNIT II	**2 A. Qualitative research methods** (a) Ideology/worldview of the qualitative researcher (b) Research designs in qualitative research (c) Sampling techniques in qualitative research (d) Data collection methods in qualitative research (e) Data analytic strategies in qualitative research (f) Reporting of results in qualitative research **2B. Scientific writing** (a) Distinguishing scientific writing from popular and literary writing styles (b) Characteristics/principles of scientific writing (c) Examples of good scientific writing (d) Writing a research proposal (d) Reporting statistical findings in text **2 C. Ethics** (a) In academia (b) In research in general (c) In research with human subjects (d) In research with animal subjects	**15**
UNIT III	**3 A. Other concepts needed for the use of advanced/inferential statistics** (a) Types of distribution Frequency distribution Normal distribution Probability distribution Sampling distribution (b) Type I and type II errors (c) Central limit theorem (d) Point estimation vs. interval estimation	**15**

	(e) Standard error (and confidence intervals) (f) Parametric and nonparametric methods **3 B. Using an advanced statistical method** (steps in using an advanced statistical method)	
UNIT IV	**4 A. To study statistics that allows us to contrast phenomena** (a) Univariate chi-square test (b) Bivariate chi-square test (c) t- or z- test for contrasting two independent groups (d) Paired t-test (e) ANOVA **4 B. To study statistics that allows us to examine relationships between variables** (a) Bivariate chi-square test (b) Product-moment correlation coefficient **4 C. Ethics in the use of statistics** (e.g., the importance of test assumptions, the number of statistical tests in a research and levels of significance)	**15**

References

Bhattacharyya, G.K. & Johnson, R. A. (1977). *Statistical Concepts and Methods.* NY: John Wiley.

Dwiwedi, R. S. (1997). *Research Methods in Behavioral Sciences.* Delhi: Macmillan India.

Gravetter, F. J. & Waillnau, L. B. (2000). *Statistics for the Behavioral Sciences.* Belmont, CA: Wadsworth/Thomson Learning.

Kerlinger, F. N. & Lee, H. B. (2000). *Foundations of Behavioral Research.* Orlando, Florida: Harcourt.

Leong, F.T.L., & Austin, J. T. (Eds.) (1996). *The Psychology Research Handbook.* New Delhi: Sage.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC202	**Exercise Physiology**	**4**	**100**	**4**

EXERCISE PHYSIOLOGY

No. of Credits: 4

Objectives:

1. To impart knowledge on the physiological effects of exercise on human body composition.
2. To explain to the students the body compositional requirement for various athletic and sports categories.
3. To enable the students understand the role of exercise in fitness.
4. To enable the students understand the therapeutic benefits of exercise.

Course Content		Lectures
UNIT I	**Cardiovascular & pulmonary response to exercise** i. Physiology of cardiovascular system ii. Effect of aerobic and anaerobic exercise training on pulmonary and cardiovascular fitness. iii. Markers of cardiovascular & pulmonary fitness	**15**
UNIT II	**Cardiovascular & pulmonary response to exercise** i. Regulation of cardio respiratory functioning ii. Adaptation of cardio respiratory system to exercise iii. Role of exercise in the diseases of CV & pulmonary system	**15**
UNIT III	**Effects of exercise** Effect of exercise on fluid and electrolyte balance & acid base balance	**15**
UNIT IV	**Effects of exercise** Exercise & thermal stress; effect of exercise on thermoregulation	**15**

References

Davier, A, Blakeley, G. H. and Kidd, C (2001) *Human Physiology*, Harcourt Pub., 1st ed. Edinburgh Churchill Livingstone.

Laboratory Manual, NIN

McArdle, WD., Katch, F. L. & Katch, VL (1996) *Exercise Physiology*, (4th ed.), Williams & Wilkins, A Waverly Company

Rhodes, R & Pflouzer, R (2003) *Human Physiology*, Thomson Brooks & Cole, (4th Ed).

Tortora, G. J. and Grabowski, R. S. (1993) *Principles of Anatomy and Physiology*, (7th ed.).Harper Collins College Publishers.

Waugh, A. and Grant, A. (2006) *Anatomy and Physiology in Health and illness* Churchill Livingstone, 10th ed.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC203	**Nutritional Biochemistry**	**4**	**100**	**4**

NUTRITIONAL BIOCHEMISTRY

No. of Credits: 4

Objectives

At the completion of this course the student should be able to

1. Describe structure, functions and metabolism of macronutrients.
2. Describe hormonal and enzymatic modulators to the metabolism of macronutrients.
3. Describe the biochemistry and metabolism of the macronutrients during different physiological states.
4. List important micronutrients needed as cofactors involved in macronutrient metabolism.
5. Explain the metabolic inter relationship between macronutrients.
6. Have knowledge of current research on Nutrition, Metabolism and dietetics.

Course Content		Lectures
UNIT I	**Enzyme chemistry** i. IUBC Classification ii. Identification of active site iii. Factors affecting enzyme activity iv. Km and its significance v. Enzyme inhibition vi. Drug-enzyme interactions vii. Enzymes of clinical significance	**15**
UNIT II	**Nutrient and drug Interactions** i. Drug metabolism ii. Drugs as antimetabolites iii. Effect of drugs on nutrient status iv. Drug food and drug-nutrient incompatibilities v. Body defense mechanisms vi. Detoxification and role of cytochrome p450 vii. Free radicals and antioxidants	**15**
UNIT III	**Hormones** i. Chemistry ii. Mechanism of secretion and physiological function of a. Thyroxine b. Catecholamines c. Insulin d. Glucagon e. Corticosteroids f. Growth hormone.	**15**
UNIT IV	**Interrelationship of nutrients** i. Vit. A – Zn ii. Vit. E – Se iii. Vit. C – Fe iv. Vit. D – Ca, P v. B-Complex Mn, Mg, Co	**15**

References

Berg J. M. Tynocrko, John, L et al *Biochemistry* 5th ed. New York W.H. Freeman and Co 2002.
Brody T. *Nutritional Biochemistry* 2nd ed. New Delhi Elsevier/Reed Elsevier India Pvt. Ltd. 2004
Chatterjee, M. N. Shinde and Rana *Textbook of Medical Biochemistry* 6th ed. New Delhi Jaypee Brothers Medical Publishers 2005.

Devlin Thomas, M (ed.) textbook *of Biochemistry with Chm*, Corr. New York, John Wiley and Sons Inc. 1997.
Montgomery, Rex and others *Biochemistry A case oriented Approach* St. Louis The C.V. Mosby Co. 1977.
Murray, R.K. and others. *Harper's Biochemistry* 25th ed. Connecticut, Appleton and large Publications.
Nelson D.L. and Cox. M.M. Lehmimnges, *Principles o Biochemistry* (3rd ed.) New York. Worth Publishers McMullan Press, 2000
Puri Dinesh *Textbook of Biochemistry*. A Clinically oriented Approach New Delhi B.I. Churchill Livingstone Pvt. Ltd. 2002.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC204	**Sports Nutrition**	**3**	**75**	**3**

SPORTS NUTRITION

No. of Credits: 3

Objectives

1. To gain the knowledge and understanding of nutrition required for exercise and sport in order to enhance performance.
2. To learn the role and significance of macro nutrients and micronutrients in achieving fitness.

Course content		Lectures
UNIT I	**Amino acids and proteins** i. Overview of digestion and absorption. ii. Amino acid metabolism, related to exercise iii. Amino acid pool during and after exercise BCAA iv. Protein turnover and exercise v. Protein synthesis – mechanism and control. vi. Physical activity and protein requirements vii. Balance studies to determine requirements viii. Utilization of protein during exercise ix. Protein intake and performance	**15**
UNIT II	**Role of vitamins in exercise** i. Effect of exercise on fat soluble and water soluble vitamins in the body ii. Food sources iii. Requirements of vitamins for sport and exercise **Role of minerals and other trace elements in exercise** i. Influence of exercise on selected minerals calcium, iron and zinc ii. Food sources iii. Requirements for exercise and sport	**15**
UNIT III	**Assessment of nutritional status of athletes** i. Kinanthropometry ii. Methodologies for assessing body composition iii. Assessment of nutritional status-dietary intake and interpretation iv. Biochemical analysis v. Clinical examination	**15**

References

Bernadot dan (1999) *Nutrition for Serious Athletes*, Human Kinetics USA.
Browns Fred and Caustan – Cargill (2002) *Essentials of Sports Nutrition* – 2nd edition John Wiley and Sons, England.
Burke Louise and Deakin Vicki (2006) *Clinical Sports Nutrition*, McGraw – Hill Pvt. Ltd. Australia.
Summerfield Lianne M (2001), *Nutrition Exercise and Behavior An integrated approach to weight management*, Belmount (USA). Wadsworth/Thompson Learning
Wolinksy I (1998) *Nutrition in Exercise and Sports* CRC press NY.
Wolinksy I, Drishill Judy (1997) *Sports and Nutrition Vitamins and Trace elements*, CRC Press BY.
Wolinskoy Ira, Driskell J. (2004) *Nutritional Ergogenic Aids*, CRC Press NY.

Course Code	Title	Lectures/week	Marks	Credits
PSHSIC205	**Nutrition Through the Life Cycle**	**3**	**75**	**3**

NUTRITION THROUGH THE LIFE CYCLE

No. of Credits: 3

Objectives

1. To understand the changes in human body composition during different stages of life.
2. To study the influence of nutrition on man during the different stages of life cycle.
3. To be aware and update the knowledge in the field of applied nutrition during the life cycle.

Course Content		Lectures
UNIT I	**Nutrition in adolescence** a) Growth and development b) Physiological and Psychological changes c) Nutritional requirements of adolescents d) Health and eating related behavior **Nutrition situation with special needs** a) Pregnancy b) Eating disorders c) Obesity – underweight d) Substance abuse e) Deficiency conditions f) Sports and athletics	**15**
UNIT II	**Nutrition in the adult years** a) Physiological and Psychosocial changes b) Common nutritional concerns c) Defensive Nutrition paradigm d) Nutritional requirements and dietary recommendation. e) Physical Activity in adulthood	**15**
UNIT III	**Nutrition in Aging/Elderly** a) Theories of Aging, Physiological and Psychosocial changes b) The Aging Process c) Nutritional requirements of the Elderly d) Nutrition care **Nutrition needs during illness and chronic conditions** a) Sensory loss b) Oral health c) GI functions d) Neuromuscular and skeletal functions e) Renal and cardiac function f) Immuno-competence	**15**

References

Bennion, H. (1979) *Clinical Nutrition*, New York Harper and Raw Publishers

Brown, J. E. (1998). *Nutrition Now*, West/Wadsworth: International Thomson Pub. Co.

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Course Code	Title	Periods/week	Marks	Credits
PSHSPIC201	**Exercise Physiology**	**3**	**75**	**3**

EXERCISE PHYSIOLOGY

No. of Credits: 3

Objectives

1. To enable students understand the methods of assessing the physiological fitness.
2. To train the students in planning exercise and counseling strategies for special conditions – weight management, diabetes, CVD etc.

Course Content		Periods
UNIT I	Assessment of skeletal fitness – BMD	**15**
UNIT II	Suitable exercise programme for special conditions Weight reduction and Weight Management	**15**
UNIT III	Suitable Exercise programme for therapeutic conditions-CVD, Diabetes, Arthritis	**15**

Course Code	Title	Periods/week	Marks	Credits
PSHSPIC202	**Assessment of Nutritional Fitness**	**3**	**75**	**3**

ASSESSMENT OF NUTRITIONAL FITNESS

No. of Credits: 3

Objectives

1. To enable students understand the importance of biomarkers of nutritional status in the management of holistic fitness.
2. To help the students acquire practical skills in the biochemical assessment of nutritional status of individuals.

Course Content		Periods
UNIT I	**Assessment of mineral status** i. Serum Iron (Dipyridol method) ii. Serum transferring and TIBC and Haemoglobin iii. Urinary Iodine and Tests for Thyroid Function	**15**
UNIT II	**Nutritional surveys** i. Anthropometrical assessment for protein and body weight abnormalities ii. Clinical symptoms of nutritional deficiencies	**15**
UNIT III	**Dietary surveys** i. Rapid Assessment surveys ii. Dietary recall and Record methods iii. Food Frequency questionnaires	**15**

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