

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 2016–2017)

M.SC. (HOME SCIENCE) BRANCH-IC : SPORTS NUTRITION**SEMESTER-I**

Course Code	Title	Theory/ Practical	Internal Marks	Semester End Exam	Total Mark s	Periods / week	Credits
PSHSI101	Research Methods and Biostatistics Paper I	Theory	40	60	100	3	4
PSHSIC102	Human Physiology and Kinesiology	Theory	40	60	100	3	4
PSHSIC103	Advances in Nutritional and Clinical Biochemistry	Theory	40	60	100	3	4
PSHSIC104	Nutrition and Fitness	Theory	40	60	100	3	4
PSHSIC105	Principles of Nutritional Assessment	Theory	40	60	100	3	4
PSHSICP101	Diet planning	Practical	-	50	50	4	2
PSHSICP102	Assessment of Body Composition and Physical Fitness	Practical	-	50	50	3	2
	Total				600	22	24

Course code	Title	Periods/week	Marks	Credits
PSHSI101	RESEARCH METHODS AND BIostatISTICS- PAPER I	3	100	4

Objectives:

1. To inculcate knowledge about essentials of high quality research.
2. To introduce students to the skills needed in conducting a research.

Course content	Periods
<p>Unit I</p> <p>A. An introduction to research methodology: -Definition, Objectives of research Types of research a) Descriptive vs. Analytical b) Applied vs. Fundamental c) Quantitative vs. qualitative d) Conceptual vs. Empirical Other types: a) Cross sectional vs. longitudinal b) Field setting or laboratory c) Clinical or diagnostic d) Exploratory Research e) Historical research.</p> <p>B. Research approach: Quantitative and qualitative approach C. Ethics in research: a) Applying for ethical approval/ clearance b) Defining the research problem: Selecting and defining the problem D. Literature review E. Formulation of hypothesis F. Research designs: a) Need for a research design, features of a good design b) Types of research designs- Explorative/ descriptive/ experimental/ Survey/ Case Study</p>	15
<p>Unit II</p> <p>A. Sampling techniques for nutrition research a) Sample design-Criteria of selecting a sampling procedure b) Characteristics of a good sampling design c) Types of sample designs: -Non-probability sampling -Probability sampling -Purposive sampling -Simple random sampling -Systematic sampling -Stratified sampling -Quota sampling -Cluster sampling - Multi-stage sampling -Sequential sampling. d) Determination of sample size for different type of research B. Measurement and scaling techniques a) Measurement scales: Nominal, Ordinal Interval, Ratio b) Validity c) Reliability and Practicality d) Scaling, scaling techniques e) Rating scales (paired comparison, rank order), likert scales etc.</p>	15
<p>Unit III</p> <p>A. Methods/ tools of data collection a) Collection of primary data: Observation method, Interview method, Questionnaire method, case study method. b) Collection of secondary data</p>	15

	c) Selection of appropriate method of data collection B. Data processing and management a) Processing operations: Editing, coding, classification, tabulation b) Use of data entry software (MS Excel & SPSS)	
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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.
- Kothari, C.R. (2004). Research Methodology-Methods and Techniques. New Age International Publishers, New Delhi.
- Leong, F.T.L. & Austin, J. T. (Eds.) (1996). The psychology research handbook. New Delhi: Sage

Course code	Title	Periods/week	Marks	Credits
PSHSIC102	HUMAN PHYSIOLOGY AND KINESIOLOGY	3	100	4

Objectives:

1. Knowledge and understanding of the skeletal and muscular systems
2. Knowledge and understanding of the functions of the musculoskeletal system in producing and controlling human movement
3. Knowledge and understanding of basic biomechanical principles which govern human movement
4. Application of biomechanical principles to physical activity, exercise performance and sport skills
5. Ability to analyze physical activity in terms of musculo-skeletal components and mechanical principles

Course content	Periods
Unit I Skeletomuscular system A. Physiology of Skeletal system a) Bone cells, Bone formation & remodeling b) Factors influencing bone formation c) Types of joints d) Bone injuries during exercise training B. Physiology of muscle tissue a) Structure, chemical composition b) Types of muscle fibers c) Mechanism and energetics of muscle contraction d) Muscle fatigue C. Anatomical and Physiological Fundamentals of Human Motion- a) The Skeletal Framework and Its Movements b) Neuromuscular Basis of Human Motion D. Fundamentals of Biomechanics a) Terminology and Measurement in Biomechanics b) The Description of Human Motion c) The Conditions of Linear Motion d) The Conditions of Rotary Motion e) The Center of Gravity and Stability E. Kinesiology of Fitness and Exercise- a) Moving Objects: -Pushing and Pulling -Throwing, Striking, and Kicking, Locomotion: Solid Surface b) Locomotion: - The Aquatic Environment, &When Suspended and Free of Support	15
Unit II Digestive and Nervous system A. Physiology of gastro intestinal system a) Structure of GI and functions b) The process of digestion and absorption of food c) Factors affecting digestion, absorption and bioavailability of macro and micro nutrients B. Physiology of Nervous system a) Structure of neurons b) Nervous system and functions c) Membrane potential d) Inter cellular communication	15
Unit III Cardiovascular, & Renal systems A. Cardiovascular system a) Blood composition b) Functions of formed elements of blood and plasma proteins c) Synthesis of blood elements d) Cardiac cycle	15

	<ul style="list-style-type: none"> e) Regulation of blood pressure f) Factors influencing Blood Pressure <p>B.Renal system</p> <ul style="list-style-type: none"> a) Structure and Functioning of kidneys b) Formation of urine, composition of urine, normal and abnormal constituents of urine, acid - base balance. 	
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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	Periods/week	Marks	Credits
PSHSIC103	ADVANCES IN NUTRITIONAL AND CLINICAL BIOCHEMISTRY	3	100	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		Periods
Unit I	Biomolecules of Nutritional Significance <ol style="list-style-type: none"> a. Carbohydrates – Oligosaccharides, Polysaccharides, sugar alcohols, Glycosides (3) b. Proteins – Essential and non-essential amino acids, Formation of specialized products from amino acids and their functions – Glutathione, Creatine – creatinine, biogenic amines (dopamine, norepinephrine, tyranine, serotonin, GABA, histamine). Biologically important peptides (Insulin, ACTH, Oxytocin, Vasopressin, Angiotensin, TRH. Four levels of protein structure and functions of Insulin, Haemoglobin, Carboxypeptidase, Keratin) (6) c. Lipids – Compound Lipids, Fatty acids, MCT's, Cholesterol, Prostanoids.(3) d. Nucleic acids Structure, properties and functions of DNA, RNA. Outline of Replication, Transcription, Translation in prokaryotes. Mutation ,DNA repair mechanism 	15
Unit II	Enzyme Chemistry and Metabolism of Macronutrients.& Energy Production <ol style="list-style-type: none"> a. IUB classification of enzymes. Active site ,Coenzymes,. Factors affecting enzyme activity. Enzyme inhibition. b. Digestion, absorption, transportation and metabolism of macronutrients(no structures) EMP,TCA,HMP,Glycogen metabolism.Cori's cycle General reactions of amino acids,Urea cycle Beta Oxidation,Ketone body formation. ETC,ATP production and Mechanism of Oxidative and Substrate level phosphorylation 	15
Unit III	A.Overview of Endocrinology <ol style="list-style-type: none"> a. Classification of Hormones, mechanism of action, synthesis of hormones – Thyroxine, Catecholamines. b. Functions and hyper – hypo states of Thyroid, Insulin, Glucagon. Adrenal, medullary and cortex B.Clinical Research and Ethical Issues- Clinical Trials – Stages I to IV, Clinical Research and its significance , Biomedical ethics in clinical trials	15

References

- Berg, J. M., Tynockro, 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 PublishersMcMullan Press, 2000

Puri Dinesh *Textbook of Biochemistry. A Clinically oriented Approach* New Delhi B.I. Churchill Livingstone Pvt.Ltd. 2002.

Course code	Title	Periods/week	Marks	Credits
PSHSIC104	NUTRITION AND FITNESS	3	100	4

Objectives:

1. To understand the various dimensions of holistic fitness
2. To understand the concepts of stress and its implications on Health
3. To imbibe knowledge about basic nutrition and influence of nutrition on fitness

Course content		Periods
Unit I	<p>A. Definition of Health and wellness</p> <ol style="list-style-type: none"> a) Factors affecting health and wellness b) Physiological, psychological and social health <p>B. Holistic Fitness</p> <ol style="list-style-type: none"> a) Definition, Types & Components of holistic Fitness <p>C. Physical fitness</p> <ol style="list-style-type: none"> a) Definition, components and Factors influencing physical fitness <p>D. Psychological Fitness</p> <ol style="list-style-type: none"> a) Addictive Behavior and its Effect on Health b) Risk factors of addiction c) Harmful effects of substance abuse d) Strategies to overcome substance abuse <p>E. Fitness for Life</p> <ol style="list-style-type: none"> a) Importance of exercise in preventing life style diseases - Diabetes, CVD, hypertension, obesity and osteoporosis b) Adherence to a fitness program regime c) Factors that affect adherence d) Difficulties faced in adherence 	15
Unit II	<p>A. Fundamentals of nutrition</p> <ol style="list-style-type: none"> a) Macronutrients & Micronutrients: Overview of the types & functions, conditions of deficiency and excess b) Energy: Components of energy expenditure & Energy requirement c) Quality issues, contribution of macronutrients to total energy intake d) Energy imbalances 	15
Unit III	<p>A. Influence of nutrition on Fitness</p> <ol style="list-style-type: none"> a) Malnutrition-Over & Undernutrition b) Changes in body composition c) Effect of macro (carbohydrates, amino acids, EFA) and micronutrients (Vitamins & Minerals) on physical & mental fitness 	15

References

- Powers, S. and Dodd, Stephen (1996) *Total fitness*, Allyss and Bacon, Univ. of Florida
- Hoeger, W., Turner, Low and W. Hafen Brent (2002), *Wellness Guidelines for a healthy life style* Wadsworth/Thomas Learning USA.
- Brannon, L. and Feist, Jess (2000), *Health Psychology IV edition, An Introduction to behaviour and health*, Wadsworth USA.
- Schafer Walt (1998) *Stress Management for IV ed. Wellness* Wadsworth USA.
- Mind, body and soul* (1998) The body shop, Bullyinch press book, little Brown and co. Bhat and Savur, S. (1998) *Fitness for life*, Jaico publishing House

Course code	Title	Periods/week	Marks	Credits
PSHSIC105	PRINCIPLES OF NUTRITIONAL ASSESSMENT	3	100	4

Objectives:

1. To enable students understand human body composition
2. To enable students learn principles of body composition and nutritional assessment

Course content		Periods
Unit I	A. Body composition a) Components of body composition b) Human Body composition- Changes during life cycle c) Factors influencing Body composition –Gender, Age, Exercise d) Methods of measuring body composition	15
Unit II	A. Anthropometrical, Biochemical & Clinical assessment of nutritional status of various age groups & gender a) Anthropometrical assessment-Linear measurements b) Circumference measurements c) Impedance techniques d) Measurement of total body protein & fat using standard formulae & Interpretation e) Biochemical assessments of nutritional status f) Clinical assessment of nutritional status	15
Unit III	A. Dietary & Functional assessment of nutritional status a) Dietary surveys- Tools of dietary surveys- FFQ, Interview schedules, questionnaires, SGA, Recall & record methods b) Protocols: merits & demerits c) Functional assessment: Functional indicators of macro and micro nutrients, disturbances & interpretation, GPAQ, WPAQ, IPAQ	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.

Course code	Title	Periods/week	Marks	Credits
PSHSICP101	PRINCIPLES OF DIET PLANNING	3	50	2

Objectives:

1. To enable students to develop expertise in the process of diet planning for normal individuals across life cycle stages for prevention of disease and preservation of health.
2. To understand the methodology of developing holistic, healthful menus and ensuring adequate macronutrient, micronutrient and fiber profile in the developed menus.
3. To become well versed with different cuisines and recipes used in India and globally.

Course content		Periods
Unit I	Diet Planning for a Normal Adult A. Planning: <ol style="list-style-type: none"> a) Recommended Dietary Allowances and the Exchange List b) Principles of establishing energy intake and proximate principles c) Principles of Menu Planning d) Overview of the traditional cuisines and eating patterns in India and in the Global Scenario e) Process and relevance of detailed calculations f) Relevance and recommendations for use and prescription of syllabus g) Process of Standardisation B. Preparation: <ol style="list-style-type: none"> a) Standardisation of basic Indian recipes. b) Preparing a meal from the planned menu, Evaluation and analysis 	15
Unit II	Diet planning for various lifecycle conditions in adult hood A. Planning: <ol style="list-style-type: none"> a) Pregnancy b) Lactation c) Geriatric B. Preparation: <ol style="list-style-type: none"> a) Preparing a meal from the planned menu b) Evaluation and analysis 	15
Unit III	Diet planning in infancy, childhood and adolescence A. Planning: <ol style="list-style-type: none"> a) Complementary Feeding b) Infant nutrition c) Childhood d) Adolescence B. Preparation: <ol style="list-style-type: none"> a) Preparing a meal from the planned menu b) Evaluation and analysis 	15

References

- Brown. J. (2013). *Nutrition Through The Lifecycle*. Wadsworth Pub Co.
- Gopalan .C.(2000). *Nutritive Value of Indian Foods*. NIN ICMR Pub.
- ICMR Pub. (2012). *Nutrient Requirement and Recommended Dietary Allowances for Indians*
- Mahan .K.L. (2012). *Krause's Food and Nutrition Therapy* Saunders Pub.
- Peckenpaugh.N. (2003) *Nutrition Essentials and Diet Therapy*. 9th ed. Saunders Pub Co.
- Sauberlich .H (1999). *Laboratory Tests for the Assessment of Nutritional Status* 2nd ed. CRC Press
- Shills. M. (2006). *Modern Nutrition in Health and Disease*.10th ed.Lippincot William and Wilkins.

Course code	Title	Periods/week	Marks	Credits
PSHSICP102	ASSESSMENT OF NUTRITIONAL STATUS	3	50	2

Objectives:

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

Course content	Periods
Unit I A. Anthropometrical assessment of body composition <ol style="list-style-type: none"> Height, Weight, BMI, Circumference measurements (Head, Arm, waist, abdominal circumference, WHR etc.);, shoulder girth Calculating body composition using standard Formulae Impedance techniques (BIA & Body stat) Skinfold measurements&Assessment of Body types using formulae DEXA, BMD (Visit) 	15
Unit II Biochemical assessment: A. Assessment of protein nutriture <ol style="list-style-type: none"> Estimation of serum Protein, Albumin and A: G Ratio (Biuret method) Urinary creatinine/Height index, Urinary urea. Evaluation of PEM in pediatric, adult, geriatric and sports persons. B. Biomarkers of vitamin status C. Fat soluble vitamins: <ol style="list-style-type: none"> Vitamin A, Vitamin D, Vitamin E Serum Retinol, Conjunctival Impression Cytology (CIC) and Dark Adaptation technique. Serum Alkaline Phosphatase, (Vitamin D) Serum Total tocopherol level and TBARS (Spectrophotometric analysis) 	15
Unit III Biochemical assessment: A. Water Soluble Vitamins <ol style="list-style-type: none"> Serum and Urinary Vitamin C (dye method) Microscopic examination of RBC for megaloblasticaemia B. Assessment of Mineral nutriture <ol style="list-style-type: none"> Estimation of serum Iron (Dipyridal method); Calcium (clark-Collip method). C. Clinicalassessment of body composition <ol style="list-style-type: none"> Observation of clinical symptoms of nutrient deficiencies Field visits/Demonstrations/Guest lectures 	15

References

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

M.SC. (HOME SCIENCE) BRANCH-IC : SPORTS NUTRITION

SEMESTER-II

Course Code	Title		Internal Marks	Semester End Exam	Total Marks	Periods/ week	Credits
PSHSI201	Research Methods and Biostatistics Paper II	Theory	40	60	100	3	4
PSHSIC202	Nutrition for Endurance Sports	Theory	40	60	100	3	4
PSHSIC203	Exercise Physiology	Theory	40	60	100	3	4
PSHSIC204	Ergonomics	Theory	40	60	100	3	4
PSHSIC205	Nutrition through Lifecycle	Theory	40	60	100	3	4
PSHSICP201	Diet Planning for Endurance Sportspersons (Practical)	Practical	-	50	50	4	2
PSHSICP202	Exercise Physiology (Practical)	Practical	-	50	50	3	2
	TOTAL				600	22	24

Course code	Title	Periods/week	Marks	Credits
PSHSI201	RESEARCH METHODS AND BIOSTATISTICS -PAPER II	3	100	4

Objectives:

1. To enable in students the skills in selecting, computing, interpreting and reporting statistics.
2. To introduce students to principles of good scientific writing.

Course content		Periods
Unit I	A. Role of statistics in research <ol style="list-style-type: none"> Measures of central tendency: Mean, Median, Mode Measures of dispersion: Range, Interquartile range, Variance and Standard Deviation Normal distribution and normal curve Testing of Statistical Hypothesis Type I and Type II errors Guidelines for selecting an appropriate test 	15
Unit II	A. Statistical tests- Applications and interpretation <ol style="list-style-type: none"> Parametric test of difference- T-test, ANOVA, Post Hoc tests Parametric tests of association- Pearson's correlation coefficient Non parametric tests of difference- Chi-square Regression Analysis B. Computer applications in analysis of data <ol style="list-style-type: none"> Introduction to SPSS- Application of SPSS (Demonstration) 	15
Unit III	A. Interpretation and Presentation of data <ol style="list-style-type: none"> Tables- Frequency distributions, Relative Frequency, Graphs- Bar graphs, Histograms, Scatter plots, Line graphs; Pie charts, Pictogram Preparation of research report/ Publication of scientific research articles Research Proposal Writing for Funding and Academic Purposes B. Information search and data retrieval <ol style="list-style-type: none"> Use of internet to extract evidence Tools for web search/ web search engines (PubMed, Cochrane Databases, Google Scholar, ResearchGate), data mining of biological databases 	15

References

- Mahajan B.K. (2010). Methods in Biostatistics for Medical students and Research Workers, Jaypee Brothers Medical Publishers (P) Ltd.
- Pagano, M. and Gauvreau, K. (2011). Principles of Biostatistics. Cengage Learning India Private Limited.
- 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	Periods/week	Marks	Credits
PSHSIC202	NUTRITION FOR ENDURANCE SPORTS	3	100	4

Objectives:

1. To enable students understand the principles of nutrition for endurance athletes
2. To impart knowledge on sports specific nutrition & hydration guidelines
3. To enable students understand the applications of ergogenic aids in endurance sports.

Course content		Periods
Unit I	A. Types of endurance sports; Energy & Macronutrient needs a) Types of endurance sports; body compositional standards b) Energy metabolism during endurance exercise & energy needs of endurance athletes B. Macronutrient needs of endurance athletes a) Sport specific nutritional guidelines b) Carbohydrates-Type & Timing of carbohydrate ingestion, Glycogen loading techniques c) Lipids- Use of ketogenic diets, Fat loading, strategies to enhance fat utilization/ Fat burners d) Proteins-Requirements, Role of protein in endurance exercise	15
Unit II	A. Micronutrient requirements of endurance athletes a) Vitamins & Minerals: Micronutrients that regulate energy metabolism, blood formation, bone health b) Antioxidant micronutrients c) Sports anemia and other sports specific micronutrient deficiencies d) Water & Electrolytes: Fluid & electrolyte requirements, Dehydration e) Fluid & electrolyte replacement strategies f) Sports drinks and sports gel	15
Unit III	Sports specific nutritional & hydration guidelines a) Short & long duration events eg: cycling, marathon, Triathlon, swimming, Rowing, sailing, etc. b) Dietary guidelines for training & competition c) Dietary guidelines on season and off season	15

References

- Ryan Monique (2015) *Sports Nutrition for Endurance Athletes*, 3rd Ed. 3002 Sterling Circle, Suite 100, Boulder, Colorado 80301-2338 USA ISBN 978-1-934030-82-0
- 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*, Belmont (USA). Wadsworth/Thompson Learning
- Wolinsky Ira (1998) *Nutrition in Exercise and Sports* CRC press Boca Raton
- Wolinsky Ira, Drishill Judy (1997) *Sports and Nutrition Vitamins and Trace elements*, CRC Press BY.
- Wolinsky Ira, Driskell J. (2004) *Nutritional Ergogenic Aids*, CRC Press NY.

Course code	Title	Periods/week	Marks	Credits
PSHSIC203	EXERCISE PHYSIOLOGY	3	100	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	Periods
Unit I A. Types of exercises- aerobic & anaerobic exercises, a) Energy systems b) Energy transfer during exercise c) Exercise & thermal stress d) Effect of exercise on thermoregulation B. Effect on Cardio-Pulmonary system a) Effect of aerobic and anaerobic exercise training on pulmonary and cardiovascular fitness b) Markers of cardiovascular & pulmonary fitness-Response & Adaptation to exercise C. Endocrine response to exercise training	15
Unit II A. Effect on Skeletomuscular system a) Response& Adaptation to exercise- Endurance, resistance and flexibility; and their effect on the composition and strength of muscle. b) Effect of training on muscle c) Exercise related muscle and bone injuries d) Adaptation to exercise, causes and concerns e) Markers of skeletal muscular fitness B. Ergogenic aids-use and concerns C. Anti-doping regulations	15
Unit III A.Exercise for Special conditions and Populations a) Special groups – Pregnant women, Children and Adolescents b) Benefits of exercise clinical conditions: Heart disease, Diabetes, Hypertension, Arthritis, Osteoporosis c) Exercise in Environmental Stress (High Altitude, Heat & Cold) d) Exercise Program Designing & Implementation for the above conditions (Aerobic & Strength Training)	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	Periods/week	Marks	Credits
PSHSIC204	ERGONOMICS	3	100	4

Objectives :

To enable students to understand.

1. The principles and applications of ergonomics in sports field.
2. The ergonomic considerations for special populations.
3. Evaluation of sports injuries and rehabilitation.

Course content	Periods
Unit I A. Ergonomics a) Definition and applications in sports B. Competitive and Training Stress in Sport a) Physiological Loading b) Spinal Loading c) Physical Loading d) Psychological Loading C. Measurement in sports & exercise a) Metabolic testing & power testing b) Optimizing training and performance goals	15
Unit II A. Environmental Influence on sports performance a) Sports Equipment and Playing Surfaces, b) Sports Clothing, Foot wear and orthotics c) Field conditions for team games B. Circadian Rhythms a) Training and Time of Day, Sleep–Wake Cycle b) Travel Fatigue and Jet Lag c) Sleep Deprivation or Disruption d) Nocturnal Shift Work e) Strategies to manage normal circadian rhythms in international athletes C. Ergonomic considerations for corporate and special populations a) Occupational ergonomics for corporate offices, schools and colleges b) Pediatric and adolescent sports persons c) Disabled and ageing athletes	15
Unit III A. Sports injuries a) Types, Evaluation & rehabilitation b) Core strengthening, c) Prolotherapy d) Postoperative athletes e) Protective devices for sports persons-head gear & knee bracing f) Participatory Ergonomics- Human Enhancement Technologie g) Performance and Cognitive Enhancement h) Mechanical & psychological ergogenic aids	15

References

- YoulianHong(2014) Routledge Handbook of Ergonomics in Sport and Exercise, London & New York
 Thomas Reilly (2010) Ergonomics in Sport and Physical Activity, Enhancing Performance and Improving Safety
 Francis G. O'Connor et al (2013) ACSM'S Sports Medicine-A comprehensive review, Wolter's Kluwer, Lippincott, Williams & Wilkins

Course code	Title	Periods/week	Marks	Credits
PSHSIC205	NUTRITION THROUGH LIFE CYCLE	3	100	4

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	Periods
Unit I Nutrition during Pregnancy & lactation A. Pregnancy: <ol style="list-style-type: none"> a) Physiology of pregnancy b) Effect of Nutritional Status on pregnancy outcome c) Nutritional requirements and dietary guidelines d) Nutrition related complications B. Lactation: <ol style="list-style-type: none"> e) Physiology of Lactation f) Human milk composition g) Nutritional requirements & dietary guidelines h) Benefits of Breast Feeding 	15
Unit II A. Nutrition in infancy, Childhood & Adolescence <ol style="list-style-type: none"> a) Physiological development, Motor, Cognitive development. b) Energy and nutrient needs c) Common nutrition problems d) Nutritional concerns (Deficiency disorders) e) Malnutrition- undernutrition & Obesity f) Eating disorders 	15
Unit III A. Nutrition in the adulthood <ol style="list-style-type: none"> a) Physiological and Psychosocial changes in adults b) Common nutritional concerns c) Defensive Nutrition paradigm d) Nutritional requirements and dietary recommendation B. Nutrition in aging <ol style="list-style-type: none"> a) Theories of Aging, Physiological and Psychosocial changes in the elderly b) The Aging Process c) Nutritional requirements of the Elderly d) Nutrition care 	15

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- 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.

Course code	Title		Periods/week	Marks	Credits
PSHSICP201	EXERCISE PHYSIOLOGY PRACTICAL		3	50	2

Objectives:

To enable the students to learn

1. Health Screening & Risk Stratification using various techniques of body composition analysis
2. Techniques of assessment of physical fitness of various groups of population

Course content	Periods
Unit I a) Health Screening & Risk Stratification b) Theoretical explanation, demonstration and assessment of cardio respiratory fitness -Treadmill stress test - Spirometry - Step tests - Resting assessments: Heart rate monitoring, Blood Pressure, Body Composition c) Cycle ergometer test etc. d) Aerobic fitness testing (VO ₂ max testing)	15
Unit II Assessment of skeletomuscular fitness -Measurement of: a) BMD (Visit/ Demonstration) b) Muscle strength c) Endurance d) Strength e) Flexibility & agility (Bench press, Jumps, Push ups, Sit and Reach Test), Sit-ups, Shuttle run, Hand grip dynamometeretc)	15
Unit III a) Assessment of physical fitness of various groups of population- children, adolescents, adults & elderly –case study b) Metabolic Calculations c) Exercise prescription for Weight Management (Underweight & Overweight)	15

References

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

Course code	Title	Periods/week	Marks	Credits
PSHSICP202	DIET PLANNING FOR ENDURANCE SPORTSPERSONS PRACTICAL	3	50	2

Objectives:

1. To enable students learn planning & cooking of diet for endurance sports persons of various age groups & gender.
2. To train the students in conducting case studies on endurance sports persons

Course content		Periods
Unit I	Planning & preparation of diets for Distance Running, Marathon, Ultra marathon, Obstacle racing and Triathlon	15
Unit II	Nutrition for Road Cycling, Mountain Biking, Track Cycling, and Cyclo-Cross, Cross-country skiing, Nutrition for Rowers and swimmers	15
Unit III	Case study presentations on the Diet & Training schedule of competitive endurance athletes	15

References

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