Faculty of Sports Medicine & Physiotherapy

SYLLABUS

FOR

M.Sc. EXERCISE & SPORTS PHYSIOLOGY
(SEMESTER: I – IV)
(Credit Based Evaluation and Grading System)

Session: 2019-20

GURU NANAK DEV UNIVERSITY AMRITSAR

M.Sc. (Exercise & Sports Physiology)
(Credit Based Evaluation and Grading System)

Semester-I:

Course No.	C/E/I	Course Title	L	T	P	Total Credits	Marks (Mid Semester + Major Exam)
Core Courses							
SHL401	C	Fundamentals of Exercise Physiology	4	0	6	7	20+80:100
SHL402	C	Kinesiology & Biomechanics	4	0	0	4	20+80:100
SPL504	C	Research and Educational Methodology	4	0	0	4	20+80:100
SHE411	C	Clinical Training – I	0	0	6	3	* C.F.
SHP412	C	Review of Literature/Dissertation	0	0	8	8	* C.F.
Total			12	0	20	26	

* C.F. (carried forward to 4th semester)

Semester-II:

Course No.	C/E/I	Course Title	L	T	P	Total Credits	Marks (Mid Sem + Major Exam)
Core Courses							
SHL451	C	Electrocardiographic Interpretation	4	0	6	7	20+80:100
SHL452	C	Basic Nutrition	4	0	0	4	20+80:100
SHE461	C	Clinical Training – II	0	0	8	4	* C.F.
SHD462	C	Dissertation	0	0	4	4	* C.F.
Elective Course (3 Credits)							
	E	Elective Course	3	0	0	3	20+80:100
Total			11	0	18	22	

* C.F. (carried forward to 4th semester)

***List of Elective Courses:**

1. Evidence Based Practice in Allied Health Sciences – SPL590
2. Women Health and Exercise – SPL591

Note:-

PSL-053 ID Course Human Rights & Constitutional Duties (Compulsory Paper) Students can opt. in any semester except Semester 1st. This ID Paper is one of the total ID Papers of this course.

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Semester-III:

Course No.	C/E/I	Course Title	L	T	P	Total Credits	Marks (Mid Sem + Major Exam)
Core Courses							
SYL501	C	Exercise Testing for Health and Skill-related Components of Fitness	4	0	0	4	20+80:100
SHL501	C	Current Concepts in Sports Nutrition	4	0	0	4	20+80:100
SYL502	C	Practicum in Dietary Analysis	4	0	0	4	20+80:100
SHE511	C	Clinical Training – II	0	0	6	3	* C.F.
SHD512	C	Dissertation	0	0	6	6	* C.F.
Interdisciplinary Course							
	I	Interdisciplinary Course	4	0	0	4	20+80:100
Total			16	0	12	25	

* C.F. (carried forward to 4th semester)

Semester-IV:

Course No.	C/E/I	Course Title	L	T	P	Total Credits	Marks (Mid Sem + Major Exam)
Core Courses							
SYL551	C	Sports Psychology	4	0	0	4	20+80:100
SHL551	C	Exercise Prescription Methods	4	0	0	4	20+80:100
SYL552	C	Current Concepts in Sports & Fitness	4	0	0	4	20+80:100
SHE561	C	Clinical Training	0	0	4	2	*600
SHD562	C	Dissertation	0	0	6	6	*600
Total			12	0	10	20	

*Total marks from I to IV semesters

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A. Theory (Examination)
Instructions to Paper Setters:
The paper setters should set 8 questions (of equal marks), two in each of the four sections (Section A to D, corresponding to the distribution in the syllabi). Further, the paper setters shall be instructed to make sub-sections (not exceeding 4) of the questions and allocate appropriate marks to 34each section. The candidates shall be asked to attempt five questions by selecting one question from each section and the fifth question may be attempted from any section.
* 1 hr of theory and dissertation is counted as 1 credit. 2 hr of practical /clinical training is counted as 1 credit.

B. Practical Examination
Practical examination of Clinical Training (includes SHE411, SHE461, SHE511 and SHE561) will be conducted once at the end of 4th semester which includes patient / athlete evaluation and management, viva-voce etc. Syllabus will include practicals throughout the 2 years of the study. It includes assessment of skill of performing practical (according to detailed syllabus), its report generation and submitting practical file.

Practical Attachments:
To enable the students to acquire practicing in hand on skills, maximum emphasis will be laid on regular practical classes, demonstration and clinical practice. The students will undergo Clinical / Field training in GNDU Campus / Sports Authority of India (Various Centres), National Institutes of Physiotherapy, other sporting centres and to the coverage of various tournaments as and when required and decided by BOC. The students will attend on field training which consists of early morning hours and evening late hours inclusive of weekends.

C. Dissertation
At the end of first semester students are expected to have a research proposal ready. At the end of second semester students are expected to be familiar with equipment handling and pilot study. At the end of third semester data collection, analysis & results should be completed. In fourth semester the work should be presented in the form of final dissertation and manuscript should be ready for communication. The student will be awarded grade for the total number of credits earned in dissertation in I, II, III and IV semesters of study at the end of the IV semester.
* A candidate shall be required to maintain minimum of 4 SGPA at the end of each semester. A student getting 'F' grade in any course in this discipline will be treated as having failed in that course and shall have to repeat the core/elective courses/or repeat/opt. another course in lieu of interdisciplinary/outside department course with approval of Board of Control, and will have to obtain at least 'P' grade in that course within specified period as per the prevailing rules. The weights of 'F' Grade will not be counted in SGPA or CGPA (according to syndicate proceeding, dated: 24.5.2010, para no. 34).
Interdisciplinary/Optional Course: to be offered from outside the department.

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SHL401: FUNDAMENTALS OF EXERCISE PHYSIOLOGY

L	T	P	Max Marks: 100
4	0	6	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Cardiovascular & Respiratory Aspects of Exercise Physiology
Cardiovascular Aspects:

1. Overview of the heart, blood vessels, and blood composition
   Heart size in the athlete & normal; difference in strength/power trained vs. endurance trained heart Acute HR, BP, SV, a-v-O_2 diff, cardiac output, blood flow responses to exercise at various intensities; from rest to maximal.
2. Chronic adaptations to endurance exercise training; various modes of training with respect to: Heart rate, Blood pressure, Stroke volume, Cardiac output, a-v-O2 difference.
   Vascularization and exercise training
   Blood pressure responses to exercise
   Determination of lactic acid and pyruvic acid in blood before and after exercise
   Determination of Hemoglobin level before and after exercise
   Anaerobic power test (*Margaria* method)
   Measurement of flexibility, agility, power and maximal work capacity
   Determination of VO2 max by: Direct method, Queen's college step test, 12 min-run test Non Exercise Test, *Astrand* rhyming nomogram method
3. Hemodynamics: Circulation and its control Determinants of blood flow
   Cardiovascular regulation and control mechanisms
   Factors determining cardiac performance: preload, afterload, contractility, HR, EDV, ESV Regulation of blood volume in sudden loss of blood
   Hemostasis and coagulation of blood Anticlotting mechanism and anticoagulants

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SECTION B

Respiratory Aspect:

1. **The basics of Ventilation:** Pulmonary anatomy, Mechanics of ventilation, Static and dynamic lung volumes, Dead space and alveolar ventilation, Minute Ventilation, Acute and chronic responses to exercise
3. **Control and regulation of ventilation** Neural-humoral mechanisms Central inputs to the inspiratory center Central Command from the motor cortex Humoral & Peripheral input
4. Acute responses to exercise from rest to maximal Chronic effects of endurance training
5. How age, gender, and race affect pulmonary ventilation during exercise
6. Gas exchange, oxygen consumption from rest to maximal exercise

SECTION C

Skeletal & Neuromuscular and Endocrine System

1. Skeletal muscle structure and contractile properties
   Types of skeletal muscle and how they are important in various sports activities Architectural properties
   Neurons, motor unit recruitment and integrative control of movements Neurological Control of Movement
   Neuromuscular Adaptations to Resistance Training
   Size principle of motor unit recruitment Contractile properties
   Types of contractions experimental models of muscle contraction Length-tension relationship
   Force-velocity relationship
2. Training for muscle strength, endurance, and power Principles of skeletal muscle adaptations Principles of endurance conditioning
   Central and neuromuscular fatigue
   Ergogenic aids that enhance muscle size and function
   Muscle glycogen; super-compensation during / before athletic competition.
3. The tissues of the human skeletal system
   Joints Adaptive abilities and capacity of the skeletal system to exercise
4. Acute effects of exercise training on hormone levels and hormone activity
   Control and regulation mechanisms involved in hormone homeostasis during exercise Chronic effects of exercise training on hormone levels, especially the elite athlete Measurement of blood pressure, sweat rate during exercise
5. Acute and chronic effects of exercise training on immunity and immune responses Age and gender differences in immune responses
   Strength training in distance runners: Impact on Running Economy
6. Hormones responsible for the anabolic and catabolic effects of exercise on muscle

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SECTION D

Applied Exercise Physiology

1. Human energy metabolism during exercise

   Human energy systems and fatigue during exercise.

2. Training for aerobic and anaerobic power Training principles

   Anaerobic/ aerobic changes with training Factors affecting training response Exercising during pregnancy

3. Muscular strength

   Strength and Resistance training

   Structural and functional adaptations to resistance training Body composition and physical performance

   Measurements of heart rate at rest and different exercising conditions

   Classification of workload & continuous recording of heart rate using heart rate monitor

   Determination of maximal heart rate, cardiac cost & cardiac efficiency-step test, cycle ergometer & treadmill

   Measurement of body temperature, (oral, axial, skin) at rest and different working condition

   Recording and interpretation of ECG & EMG at rest and working condition; effects of posture on ECG

   Determination of pulmonary ventilation; Static and dynamic lung function tests

4. Exercise performance and Environmental Stress Exercising at Medium And High Altitude Thermal stress (thermoregulation) during Exercise

Practicals:

- To measure the normal Blood Pressure and its postural effect and exercise effect
- To determine the pulse rate on human body
- To evaluate the cardiac efficiency test on sports person/ normal healthy adults
- To assess the autonomic system of normal healthy adults

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REFERENCES:

Textbooks:

1. ACSM's *Guidelines for Exercise Testing and Prescription*, 8th ed., Lippincott Williams & Wilkins, Philadelphia, 2009.
2. Wilmore, J., Costill, D., and Kenney, W. *Physiology of Sport and Exercise*, 4th ed., Human Kinetics, 2008.
3. Brooks, G., Fahey, T., and Baldwin, K. *Exercise Physiology: Human Bioenergetics and Its Applications*, 4th ed. McGraw Hill
4. McArdle, W, Katch, F., and Katch, V. *Exercise Physiology: Energy, Nutrition, and Human Performance*, Lippincott Williams & Wilkins.
5. Astrand, P, et al. *Textbook of Work Physiology*, 4th ed., Human Kinetics, 2003.
6. Williams, Nutrition for Health, Fitness and Sport, 7th ed. Mc Graw Hill

Peer-reviewed journals

Strength and Conditioning Journal

Journal of Strength and Conditioning Research

Medicine and Science in Sports and Exercise

American Journal of Physiology

Online resources

www.acsm.org/

www.nsca-lift.org/

www.the-aps.org/

www.faseb.org

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SHL402: KINESIOLOGY & BIOMECHANICS

L	T	P	Max Marks: 100
4	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Introduction to Kinematics

a) Definition, aims, objectives and role of Kinesiology in sports physiotherapy.
b) Review of fundamental concepts (applied aspect), Centre of gravity, Line of gravity, Planes, Lever system in Body, Fundamental starting positions.
c) Review of linear and angular kinematics

SECTION B

Mechanics of Musculoskeletal System

a) Tissue loads, response of tissues to forces- Stress, Strain, Stiffness and mechanical strength, visco elasticity
b) Physical Properties of bone, cartilage, tendon and ligaments, functional adaptation under pathological conditions.
c) Impaired neuromuscular control, muscular force regulation in
Frame work and joints of the body: Influence of trauma and classification of the muscles, Relation of structure, functions, role of muscles, types of Muscle, contractions (Static, Concentric and Eccentric), Two joint Muscles, Angle of pull, Role of Gravity affecting muscular action.

SECTION C

I. Introduction

a) Nature and importance of Biomechanics in Physiotherapy
b) Principle of Biomechanics

II. Movement Analysis

a) Biomechanics of shoulder and shoulder complex, elbow complex, wrist and hand complex
b) Biomechanics of pelvic, hip, knee, ankle & foot complex
c) Biomechanics of spine

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SECTION D

Movement Analysis

a) Neuro biomechanics

b) Posture and Gait analysis

c) Biomechanical Analysis & Techniques – Force platforms

References:

1. Brunnstrom – Clinical Kinesiology, F.A. Davis.
2. Luttgens K., Hamilton N.: Kinesiology – Scientific Basis of Human Motion 9th Edi, 1997, Brown & Benchmark.
3. Rasch and Burk: Kinesiology and Applied Anatomy, Lee and Fabiger.
4. White and Punjabi – Biomechanics of Spine – Lippincott.
5. Kapandji: Physiology of Joints Vol. I, II & III, W.B. Saunders.
6. Mishra: Clinical Neurophysiology, B.I. Churchill Livingstone.

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SPL504: RESEARCH AND EDUCATIONAL METHODOLOGY

L	T	P	Max Marks: 100
4	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

1. **Basic concepts-**Importance of research in clinical practice, Problem identification, Ethical issues in research, Literature review, meta-analysis
2. **Types of Research-**Qualitative & Quantitative, Descriptive & Experimental, Longitudinal & Cross–sectional, Survey Research.
3. **Sample Designs-**Types of sampling, Reliability, Validity, Variables, sample size.

SECTION B

1. **Processing and analysis of data-**Central tendency, Dispersion, Correlation, regression analysis, multiple correlation and regression.
2. **Sampling and testing of hypothesis-**Concept of probability, Standard deviation, confidence intervals, null and alternate hypothesis, level of significance, correlation coefficients, ANOVA, Tukey's HSD.
3. **Non parametric tests-**Fisher Irwin test, Mc Nemar test, Wilcoxon Mali test, Mann Whitney test, Kruskal Walis test, Spearman's rank correlation.

SECTION C

1. **Define-**Symposia, Seminar, Conference, Journal, Thesis, Book, Key elements of scientific writing.
2. **Presenting Research-**Strategies of paper writing, Design of paper writing, Tactics of paper writing, Reasons for rejection, Where to publish, Poster presentation (Poster space, Standard format), Plagiarism.

3. **Oral Presentations at Conferences/Seminars-**Preparing presentation, Duration of presentation, What to present

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SECTION D

Educational Methodology-Principles and methods of teaching with respect to physiotherapy students and client: Strategies and planning of teaching, curriculum development, formation of course objective, time management, role of Audio – visual aids, method of knowledge dissemination.

Practicals:

The student will be required to review the literature thoroughly and prepare a research proposal for dissertation in consultation with his/her supervisor by the end of the semester.

References:

1. Mohsin S.M.: Research Methods in Behavioral Sciences: Orient Publications.
2. Colton: Statistics in medicine, Little Brown Company, Boston.
3. Mahajan: Methods in Biostatistics, Jay Pee Brothers.
4. Vincent: Statistics in Kinesiology, Human Kinetics.
5. Hicks: Research for Physiotherapists, Churchill Livingstone

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SHL451: ELECTROCARDIOGRAPHIC INTERPRETATION

L	T	P	Max Marks: 100
4	0	6	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Normal heart electrophysiology

1. Anatomy of the heart
   Location of heart in chest cavity
   Blood vessels that supply the heart
   Blood flow through the heart
   Electrophysiology of the heart
   Normal electrical pathway
   Electrical-mechanical association
   Relationship among electrical conduction, blood flow through the heart, pressures inside the heart, and mechanical contraction

SECTION B

1. EKG equipment and placement of electrodes in 12-lead Goldberger's three basic laws of electrophysiology Einthoven's triangle
   Leads: I, II, III, AVR, AVF, AVL, V1 – V6
   One cardiac cycle EKG waveforms, segments, and intervals, and their representation of electrical conduction; Resting 12-lead electrocardiogram normal limits
   The difference between resting and exercise EKG electrodes used
2. Electrocardiogram interpretation steps
   Normal limits of waveforms, segments, and intervals and what it means to be out of the normal limit
3. Normal sinus rhythm Sinus Bradycardia Sinus Tachycardia
   Normal EKG changes during exercise testing
   What is artifact? What are the major categories of artifact? What do they look like? When do they occur?

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SECTION C

Abnormal heart electrophysiology

1. Ectopic foci
   Inherent rates of sinus, atrial, junctional, and ventricular rhythms Premature beats: PAC, PJC, PVC Escape beats
   Exercise restrictions
2. Supraventricular rhythms Sinus arrhythmias
   Rhythms originating from ectopic foci: atrial, junctional, ventricular Exercise restrictions
3. AV heart blocks
   1st degree
   2nd degree – two types
   3rd degree
   Exercise restrictions
4. Bundle Branch Block Right and Left Hemiblocks Exercise restrictions
5. Wolfe-Parkinson-White (WPW) Syndrome LGL Syndrome
   Exercise restrictions

SECTION D

Other electrophysiology considerations

1. Criteria for determining ischemia, injury, and infarction
2. Determination of Axis
   Quadrants: Normal, LAD, RAD, and extreme RAD
   Degrees
   Rotation—transition zone
3. Pacemaker rhythms
   External and implantable
   Pacemaker codes
   Exercise restrictions
4. Monitoring leads
   Electrode placement

Practicals:

To measure the clinical examination of cardiovascular and respiratory aspect on patients

- Demonstration of different VO_2 (oxygen consumption) protocols on different platform
- Demonstration of ECG and its interpretation
- Demonstration of team performance physiological variables instrument.

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References:

Textbooks:

1. Booth, et al. *Electrocardiography for Health Care Personnel*, 2nd Ed., McGraw-Hill, 2008.
2. De Luna. *Clinical Electrocardiography: At Textbook*, 2nd Ed., Futura Publishing Company, 1998.
3. Wagner, G. *Marriott's Practical Electrocardiography*, 11th ed., Liippincott Williams & Wilkins, 2007.

Peer-reviewed Journals:

Annals of Noninvasive Electrocardiology : the official journal of the International Society for Holter and Noninvasive Electrocardiology, Inc.

Journal of Electrocardiology

Online Resources:

www.**ecg**library.com/

*library.med.utah.edu/kw/**ecg**/*

*www.**12leadecg**.com/full/*

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SHL452: BASIC NUTRITION

L	T	P	Max Marks: 100
4	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Nutrition Basics

1. What Nourishes You?
   The Basis of a Healthy Diet
   The food pyramid
   Energy density of macronutrients and alcohol
2. Human Digestion and Absorption Metabolism of the energy-yielding nutrients
   Bioenergetics: fuels for exercise and their pathways Anaerobic metabolism
   ATP-CP, Myokinase, fast glycolysis, lactic acid production Fate of lactic acid
   Aerobic metabolism
   Transition into the mitochondria, Kreb's cycle, ETC Macronutrients: when are they used for fuel for exercise?
   Carbohydrates Lipids Proteins
   Alcohol metabolism

SECTION B

1. The Vitamins
   The Fat-Soluble Vitamins The Water-Soluble Vitamins Major Minerals
   Trace Minerals
2. The importance of water
   How water is involved in metabolism The importance of hydration
   The athlete and proper hydration Hydration guidelines

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SECTION C

Energy Production and Energy Balance

1. Units of energy
   Measurement of energy expenditure by direct and indirect calorimetry Basal metabolic rate, respiratory quotient, specific dynamic action Factors effecting BMR
   Prerequisites of measuring BMR and RMR
   Specific dynamic action of food
   Regulation of energy balance
2. Anaerobic energy systems Aerobic energy pathways
   Energy Balance and Weight Control Concerns of obesity epidemic Causes

SECTION D

Nutrition for Sports and Fitness

1. Special considerations for competitive athletes
   Special needs for vegetarian athletes Energy needs of the athlete Pre-competition meals During competition, post-competition and recovery guidelines for electrolyte replacements
2. Nutrition Applications in the Life Cycle Nutrition from Infancy through Adolescence Nutrition during Adulthood.
3. Nutritional disorders: Anorexia Nervosa Bulimia Nervosa Binge-Eating Disorder Other Conditions Metabolic Syndrome, Female Athlete Triad. The ethics of weight control in some sports

References:

Textbooks:

1. Ed. Gibney, et al. *Introduction to Human Nutrition*, Blackwell, 2002.
2. Groff & Gropper. *Advanced Nutrition and Human Metabolism*, 3rd Ed., Wadsworth, 2000.
3. Jeukendrup & Gleeson. *Sport Nutrition*, Human Kinetics, 2004.
4. Antia F.P. 'Clinical Dietetics and Nutrition'. III Edition. Oxford University Press. Bombay, 1989. Modern Nutrition in Health and Disease. Shils, M.E. and Young V.R. Bombay K.M. Varghese Company (VI Edition 1988)
5. Passmore, P. and M.A. Eastwook. (1986). Human Nutrition and Dietetics. ELBS, Churchill, Livingstone, 8th Edition Shils, M.E. and Young V.R. (1988). Modern Nutrition in Health and Disease.
6. Bombay K.M. Varghese Company (VI edition) Mahan, L.K. & Ecott-Stump, S. (2000). Krause's Food, Nutrition and Diet
7. Therapy, 10th Edition, W.B. Saunders Pvt. Ltd.

Peer-reviewed journals

The Journal of Nutrition
The American Journal of Clinical Nutrition
European Journal of Clinical Nutrition
British Journal of Nutrition

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SPL590: EVIDENCE BASED PRACTICE IN ALLIED HEALTH SCIENCES (ELECTIVE)

L	T	P	Max Marks: 100
3	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

1. Introduction to evidence- based complementary medicine

2. Evidence-based health care

3 .Evidence-based practices

4. Evidence-based decision making and management

SECTION B

Types of Evidence:

a. Definition of evidence

b. Forms of evidence

c. Randomized controlled trials

SECTION C

a. Case-control studies

b. Cohort studies

SECTION D

1. Applying the evidence

a. Pathways, guidelines and protocols

b. Future directions for clinical effectiveness

2. Evaluation of effectiveness and efficiency of the process

References:

1. Martin Dawes, Philip Davies, and Alistair Gray, Evidence-Based Practice: A Primer for Health Care Professionals. Elsevier Publication.
2. Albert R. Roberts and Kenneth R. Yeager, Evidence-Based Practice Manual: Research and Outcome Measures in Health and Human Services, Oxford University Press.
3. Allen Rubin, Practitioner's Guide to Using Research for Evidence-Based Practice. John Willey & Sons Publication.
4. Domhnall MacAuleyThomas M Best, Evidence-based Sports Medicine. BMJ Books.
5. Kathryn Refshauge and Elizabeth Gass, Musculoskeletal Physiotherapy: Its Clinical Science and Evidence-Based Practice. Churchill Livingstone.
6. Allen Rubin, Statistics for Evidence-Based Practice and Evaluation. Cengage Learning.
7. Bernadette Melnyk, Ellen Fineout-Overholt, Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice, Lippincott Williams & Wilkins.

M.Sc. (Exercise & Sports Physiology) (Semester-II)
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SPL591: WOMEN HEALTH AND EXERCISE (ELECTIVE)

L	T	P	Max Marks: 100
3	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

1. Gender difference in muscle morphology
2. Diagnosis and Treatment of Urinary Incontinence and Prolapse
3. Anemia

SECTION B

1. Hypertension in Women
2. Bone health: assessment and treatment of osteopenia and osteoporosis
3. Evaluation and Treatment of Common Musculoskeletal Complaints

SECTION C

1. Exercise for the childbearing year
2. Exercise for adolescence
3. Perimenopausal and post menopausal

SECTION D

1. Exercise in Athletic Women
2. Medical Problems in Sports Women

References:

1. Nadya Swedan (2001): Women's Sports Medicine and Rehabilitation. An Aspen Publication.
2. Mary Lloyd Ireland & Aurelia Nattiv (2002): The Female Athlete. Saunders Publication.
3. Cardozo L and Staskin D (2006): Textbook of Female Urology and Urogynaecology (2nd edn). London: Isis Medical Media Ltd.
4. Mantle J, Haslam J and Barton S (2004): Physiotherapy in Obstetrics and Gynaecology. (2nd ed.) London: Butterworth-Heinemann.
5. Sapsford R, Markwell S and Bullock-Saxton J (1998): Women's Health: A Textbook for Physiotherapists. London: WB Saunders Company Ltd.
6. Bo, K., Berghmans, L.C.M., Van Kampen, M., Morkved, S. (2007). Evidence-Based Physical Therapy for the Pelvic Floor: Bridging Science and Clinical Practice. London: Churchill Livingstone.

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SYL501: EXERCISE TESTING FOR HEALTH-AND SKILL-RELATED COMPONENTS OF FITNESS

L	T	P	Max Marks: 100
4	0	6	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Pre-test considerations

1. Benefits associated with physical activity
   Physical activity and fitness terminology
   Public health perspective for current recommendations Benefits of regular physical activity
   Exercise dose response relationship
2. Risks associated with physical activity
   Sudden death among young individuals and athletes Exercise events in those with sickle cell trait Exercise-related cardiac events in adults
   Safety considerations
   Risks associated with exercise testing
3. Pre-participation screening algorithm Risk stratification and medical clearance Pre-exercise test evaluations
   Baseline measurements
   Calculation of HR MAX and 85% HR max depending on protocol Additional preparticipation assessments
   Exercise testing and testing supervision recommendations Population considerations
   Children, elderly, apparently healthy, etc.
4. Test Order
   Equations used to estimate aerobic power from TM protocols Cycle ergometer protocols (arm and leg)
   Equations used to estimate aerobic power from cycle ergometer protocols ACSM guidelines for when to stop a test
   Calculations used to estimate aerobic power from other variables

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SECTION B

Test protocols used for measuring the health- and skill-related components of fitness

1. CV endurance field tests VO2max testing Norm tables
   Maximal vs submaximal tests Modes of testing
2. Muscular strength, endurance, and flexibility
3. Body composition
4. Balance, agility, coordination, reaction time, and anaerobic power

SECTION C

Exercise testing modifications for cardiac patients

1. Pre-participation screening and risk stratification Medical history
   Medical clearance
   Physician approval for testing Risk factor identification Medical emergency equipment
   Risks of cardiac events during exercise testing
2. Diagnostic exercise testing
   Exercise testing for disease severity and prognosis Functional exercise testing
   Measurements during exercise testing Exercise testing after an MI
   Exercise testing protocols, modalities, and testing supervision recommendations
   Exercise testing for return to work
   Indications for stopping a test Post-exercise period
   Cognitive skills required to competently supervise exercise tests Exercise testing with imaging modalities
   Exercise echocardiography Exercise nuclear imaging Pharmacologic stress testing
   Electron beam computed tomography
   Interpretation of clinical exercise test data

SECTION D

1. Risk stratification for cardiac patients Inpatient rehabilitation programs
   Clinical indications and contraindications for inpatient and outpatient cardiac rehabilitation
   Outpatient exercise programs
   Recommendations for supervision and monitoring of exercise
   Signs and symptoms below which an upper limit for exercise intensity should be set
   FITT principle and progression of exercise for the cardiac patient
   Guidelines for exercise prescription for cardiac patients without an entry exercise stress test
   Benefits of endurance exercise training in cardiac patients Benefits of resistance training for cardiac patients
   Risks of cardiac events during cardiac rehabilitation Prevention of exercise-related cardiac events Exercise training for return to work

2. Special cardiac patient populations Myocardial ischemia Congestive heart failure Pacemakers and implantable cardioverter defibrillators Cardiac transplant recipient Coronary bypass graft and percutaneous transluminal coronary intervention

Practicals:

- Demonstration of Kinematic measurement system and its data collection and report analysis
- Demonstration of strength and power analysis instrument and its data export and related analysis.
- Demonstration of EMG, its importance and data collection and interpretation
- Demonstration of Dynamic force platform and its data collection and interpretation

References:

Textbooks:

1. Heyward, Vivian. *Advanced Fitness Assessment and Exercise Prescription*, 5th ed., Human Kinetics, 2006.
2. ACSM's *Guidelines for Exercise Testing and Prescription*, 8th Ed., Lippincott Williams and Wilkins, 2009.
3. Ed. Durstine and Moore. *ACSM's Exercise Management for Persons with Chronic Diseases and Disabilities*, 2nd Ed. Human Kinetics, 2003
4. ACSM's Health-Related Physical Fitness Assessment Manual, 3rd Ed, 2009.

Peer-reviewed Journals:

Strength and Conditioning Journal

Journal of Strength and Conditioning Research

Medicine and Science in Sports and Exercise

Online Resources:

www.acsm.org/

www.nsca-lift.org/

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SHL501: CURRENT CONCEPTS IN SPORTS NUTRITION

L	T	P	Max Marks: 100
4	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Research related to pre-competition meals

1. Timing of pre-competition meals
2. Content of pre-competition meals
3. Glucose and insulin responses of pre-competition meals
4. Glycogen loading (supercompensation)
5. Different needs for specific sports activities

SECTION B

Research related to post-competition meals

1. Timing of post-competition meals
2. Content of post-competition meals
3. Different needs for specific sports activities
4. The importance of recovery; optimal amount of recovery time according to training/competition

SECTION C

Research related to dietary supplements and their effects on performance

1. Vitamins and minerals
2. Creatine phosphate; creatine monohydrate; other creatine supplements
3. Sodium bicarb and other buffering agents
4. Ginseng
5. Caffeine
6. Over the counter drugs: i.e., amphetamines
7. Prescribed drugs: i.e., beta blockers

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SECTION D

1. Illegal substances
2. Substances banned by athletic organizations and the IOC: Position Stands
3. Blood Doping
4. Drug Testing.
5. Ethics and Philosophy of Drug Testing

Seminars and Group Discussion: It will be mandatory for students to conduct seminars on the latest trends in Sports Nutrition.

References:

Textbooks:

1. Ed. Burke & Deakin. *Clinical Sports Nutrition,* 3rd Ed., McGraw-Hill
2. Burke, *Practical Sports Nutrition,* Human Kinetics, 2007.

Peer-reviewed Journals:

Journal of the International Society of Sports Nutrition
Journal of Sports Nutrition

Online Resources:

*www.**sportsnutrition**society.org*
http://www.ausport.gov.au/ais/nutrition/publications/current_concepts
*www.**sportsnutrition**guide.net*

Other:

American College of Sports Medicine position stand. Nutrition and athletic performance. American Dietetic Association; Dietitians of Canada; ACSM, Rodriguez, NR, DiMarco, NM, & Langley, S.
Med Sci Sports Exerc. 2009 Mar;41(3):709-31. J Am Diet Assoc. 2009 Mar;109(3):509-27.
American College of Sports Medicine 1996: Position Stand, "Exercise and Fluid Replacement" *Medicine and Science in Sports and Exercise* 28:i–vii, 1996. Consult this source, or www.acsm.org, for reference citations used in this Position Stand.

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SYL502: PRACTICUM IN DIETARY ANALYSIS

L	T	P	Max Marks: 100
4	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Overview of Dietary Assessment

1. Historical comparisons of RDI and RDA
2. Dietary Guidelines for normal individuals
3. Dietary Guidelines for special needs
4. Formulate interview questions
5. Guidelines for keeping a diary/log

SECTION B

Dietary Assessment: the DRI

1. Dietary Reference Intake tables
2. Dietary Reference Intake reports
3. Individual macronutrients, phytonutrients, vitamins and minerals
4. Interpret lab data
5. Write a care plan
6. Document in a medical record
7. Assessment of Nutritional Status
   - Anthropometry
   - Dietary Survey
   - Clinical Examination
   - Biochemical Estimations

SECTION C

Clinical Nutrition

1. Role of dietitian and Nutritionist
2. Basic concept of diet therapy
3. Therapeutic adaptation of normal diet
4. Obesity – causes, prevention and dietary modificati on
5. Underweight – causes and Dietary modifications
6. Dietary Counseling

- Special feeding methods (enteral, parentral) feeding the patients and psychology of feeding.

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SECTION D

1. Incidence, etiology, pathology and metabolic aberrations, clinical manifestations, complications and dietary management and counseling for the following diseases:
   a. Fevers (acute & chronic), effects upon metabolism and diet.
   b. GIT Diseases – peptic ulcer, ulcerative Colitis, Mal-absorption Syndrome
   c. Carbohydrate and Fat intolerance, Celiac disease.
   d. Liver disease –Hepatitis, Cirrhosis
   e. Diseases of Pancreas and Gall bladder
   f. Cardiovascular diseases – Hypertension, Hyperlipidemia, Coronary Heart diseases
   g. Diabetes mellitus (Juvenile and adult onset types)
   h. Renal diseases – Glomerulonepheritis, Nephrotic Syndrome

References:

Textbooks:

1. Shils, M.E. and Young V.R. (vi edition 1988) Modern Nutrition in Health and
2. Disease. Bombay K.M. Varghese Company
3. Antia, F.P. (1989) Clinical Dietetics and Nutrition. Oxford University Press,
4. Bombay, 3rd Edition
5. Passmore, P. and M.A. Eastwook. (1986). Human Nutrition and Dietetics. ELBS,
6. Churchill, Livingstone, 8th Edition
7. Mahan, L.K. & Ecott-Stump, S. (2000) : Krause's Food, Nutrition and Diet
8. Therapy, 10th Edition, W.B. Saunders Pvt. Ltd.
9. Jacqueline Morris, RD, MPH, CDN, Executive Director, Annex Nutrition Services, Elmsford, New York, *Dietitian's Guide to Assessment and Documentation,* Jones and Bartlett Publishers, 2011.

Peer-reviewed Journals:

Journal of Nutrition Education and Behavior

Online Resources:

Nutrition Analysis Tool 2.0
http://www.nat.uiuc.edu/
http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=2&tax_subject=256&t opic_id=1325
Diet History Questionnaire
http://riskfactor.cancer.gov/DHQ/
Dietary Assessment Calibration/Validation Register *http://appliedresearch.cancer.gov/cgi-bin/dacv/index.pl*

Other:

United States Department of Agriculture National Agricultural Library, Food and Nutrition Information Center
http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=2&tax_subject=256&topic_id=1342
WHO Experts Raise Antiquated Nutrition Standards – Major implications for millions of malnourished children, 2008. *http://www.msfaccess.org/media-room/press-releases/press-release-detail/?tx_ttnews%5Btt_news%5D=1486&cHash=2e040b6c20*
World Health Organization, topics on diet and nutrition *http://www.who.int/topics/diet/en/*
Nutrigrade Software, Song, et al

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SYL551: SPORTS PSYCHOLOGY

L	T	P	Max Marks: 100
4	0	2	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

1. **History and current status of Sports Psychology**.
2. **Personality Assessment and sports personality**.
   a. Theories of personality
   b. Personality assessment
3. **Attention and perception in sports**.
   a. Attention
   b. Perception
4. **Concentration training in sports**.
   a. Basic principles of concentration
   b. Concentration training
   c. Concentration awareness exercises
5. **Motivational orientation in sports**.
   a. Athlete's needs of motivation
   b. Motivational inhibitors
   c. Motivational techniques

SECTION B

1. 1. **Pre-competitive anxiety**.
   a. Source of PCA
   b. Effect of PCA on performance
2. **Relaxation Training**.
   a. Definition
   b. Types of relaxation trainings
      i) Progressive muscle relaxation
      ii) Breathing exercises
      iii) Yognidra
      iv) Transcendental meditation

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3. **Aggression in sports**.
   a. Theories of aggression
   b. Management of aggression
4. **Role of Psychology in Dealing with injuries**.
5. **Eating disorders**.
   a. Etiology of eating disorders
   b. Types of eating disorders
   c. Complications of eating disorders
6. Goal setting i) Principles and ii) strategies

SECTION C

Doping and Stress Management

1. Psychological aspect of doping
2. Psychological preparation of elite athletes a. Concept of psychological preparation
3. Biofeedback training
4. Mental imagery
5. Stress management
   a.Principles of Stress Management b. Stress Management techniques

SECTION D

1. Group Behaviour and Leadership:
   a. Nature of group behaviour and group.
   b. Types of group.
   c. Educational implication of group behaviour.
   d. Meaning of leadership, types of leadership quality of leadership, training and functioning of leadership.
2. Emotion:
   a. Meaning of emotion.
   b. Characteristics of emotion.
   c. Meaning of controlling and training of emotions and its importance.
   d. Contribution of sports to emotional health.
   e. Meaning of sentiment, its type, importance and formation.

Practicals:

- Demonstration of eye tracking data collection and its interpretation
- Demonstration of EEG its data collection and interpretation
- Demonstration of CANTAB data collection and report interpretation
- Demonstration of other psychological training and its implementation on sports science

References:

1. Morgan and King: Introduction to Psychology - Tata McGraw Hill.
2. Suinn: Psychology in Sports: Methods and applications, Surjeet Publications.
3. Grafiti: Psychology in Contemporary Sports, Prentice Hall.
4. Basmajian: Biofeedback
5. Sanjiv P. Sahni: Handbook of Sports Psychology – A Comprehensive Manual of Mental Training

1. M.Sc. (Exercise & Sports Physiology) (Semester-IV)
(Credit Based Evaluation and Grading System)

SHL551: EXERCISE PRESCRIPTION METHODS

L	T	P	Max Marks: 100
4	0	0	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

General principles of exercise prescription

1. Legal issues regarding Waiver, informed consent, PAR Q medical clearance needed? baseline measurements taken before exercise tests
2. Importance of warm up and cool down instructions in an exercise prescription
3. The FITT principle and rate of progression Principles of training

SECTION B

4. Methods of prescribing intensity of endurance exercise VO_2
VO_2 reserve
HR
HR reserve
Rating of perceived exertion Symptom-limited
Energy expenditure

SECTION C

Clinical conditions influencing exercise prescription

1. Arthritis Osteoporosis Hypertension
2. Obesity
Metabolic disorders Metabolic syndrome
3. Immunological diseases
Exercise and upper respiratory tract infections
4. Peripheral arterial disease Pulmonary diseases

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SECTION D

Other special conditions in the healthy population

1. Pregnancy
2. Elderly
3. Children
4. Physically handicapped

References:

Textbooks:

ACSM's Guidelines for ExerciseTesting and Prescription, 8th ed., Liippincott, Williams, & Wilkins, 2009.

Skinner, J., Exercise Testing and Exercise Prescription for Special Cases—theoretical basis and clinical application. 3rd ed., Lippincott Williams & Wilkins, 2005.

Peer-reviewed journals

ACSM's Health & Fitness Journal

Online resources

www.acsm.org/
www.nsca-lift.org/

Other:

American College of Sports Medicine Position Stand: appropriate physical activity intervention strategies for weight loss and prevention of weight regain for adults, *Medicine and Science in Sports & Exercise*, Feb, 2009.

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SYL552: CURRENT CONCEPTS IN SPORTS & FITNESS

L	T	P	Max Marks: 100
4	0	4	Mid Term: 20
			Major Exam: 80

Mid Semester Examination: 20% weightage
End Semester Examination: 80% weightage

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION A

Trends in Fitness Facilities and Exercise Equipment

1. History of physical education, fitness activities, exercise facilities
2. Types of equipment: past and present

SECTION B

Trends in Physical Activity, Health, and Chronic Disease

1. Reports from World Health Organization, Centers for Disease Control, Indian Authorities
2. Risk factors associated with chronic disease: prevalence in different parts of the world Hypertension
   Diabetes Hyperlipidemia Metabolic syndrome Obesity

SECTION C

1. Sports-related deaths
   Sudden deaths
2. Position Stands:
   American College of Sports Medicine
   National Strength and Conditioning Association
   International Olympic Committee

SECTION D

Health Benefits of Exercise

1. Health benefits of exercise Effects on morbitity Effects on mortality
2. The Exercise and Physical Activity Pyramid
   Role of physical activity and exercise in disease prevention and rehabilitation

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Practicals:

- Demonstration of HRV data collection and its interpretation
- Demonstration of Skin conductance and its data collection and interpretation
- Demonstration of Spirometry data collection and report interpretation
- Demonstration of biochemical analysis (biomarkers) related to sports performance

Seminars & Group Discussion:
It will be mandatory for students to conduct seminars on the latest trends in Sports Fitness.

References:
Textbooks:
NASM Essentials of Personal Fitness Training, 3rd Ed., Lippincott Williams & Wilkins, 2007.

Risk Management for Health/Fitness Professionals, Lippincott Williams & Wilkins, 2008.

Peer-reviewed Journals:
ACSM's Health & Fitness Journal

Current Sports Medicine Reports

Exercise and Sport Sciences Reviews

Online Resources:
www.acsm.org/

www.nsca-lift.org/