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

Note:  (i) Copy rights are reserved.
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Defaulters will be prosecuted.

(ii) Subject to change in the syllabi at any time.
Please visit the University website time to time.
M.Sc. (Exercise & Sports Physiology)  
(Credit Based Evaluation and Grading System)

**Semester-I:**

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* C.F. (carried forward to 4\textsuperscript{th} 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 1\textsuperscript{st}. This ID Paper is one of the total ID Papers of this course.
M.Sc. (Exercise & Sports Physiology)  
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**Semester-III:**

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

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*Total marks from I to IV semesters
M.Sc. (Exercise & Sports Physiology)  
(Credit Based Evaluation and Grading System)

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

**SHL401: FUNDAMENTALS OF EXERCISE PHYSIOLOGY**

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**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-O2 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
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
M.Sc. (Exercise & Sports Physiology) (Semester-I)  
(Credit Based Evaluation and Grading System)

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
REFERENCES:

Textbooks:


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/](http://www.acsm.org/)

[www.nsca-lift.org/](http://www.nsca-lift.org/)

[www.the-aps.org/](http://www.the-aps.org/)

[www.faseb.org](http://www.faseb.org)
M.Sc. (Exercise & Sports Physiology) (Semester-I)
(Credit Based Evaluation and Grading System)

**SHL402: KINESIOLOGY & BIOMECHANICS**

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

**SECTION B**

**Mechanics of Musculoskeletal System**
- Tissue loads, response of tissues to forces- Stress, Strain, Stiffness and mechanical strength, visco elasticity
- Physical Properties of bone, cartilage, tendon and ligaments, functional adaptation under pathological conditions.
- 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**
- Nature and importance of Biomechanics in Physiotherapy
- Principle of Biomechanics

**II. Movement Analysis**
- Biomechanics of shoulder and shoulder complex, elbow complex, wrist and hand complex
- Biomechanics of pelvic, hip, knee, ankle & foot complex
- Biomechanics of spine
M.Sc. (Exercise & Sports Physiology) (Semester-I)
(Credit Based Evaluation and Grading System)

SECTION D

Movement Analysis

a) Neuro biomechanics
b) Posture and Gait analysis
c) Biomechanical Analysis & Techniques – Force platforms

References:
M.Sc. (Exercise & Sports Physiology) (Semester-I)
(Credit Based Evaluation and Grading System)

**SPL504: RESEARCH AND EDUCATIONAL METHODOLOGY**

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**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**
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
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:

5. Hicks: Research for Physiotherapists, Churchill Livingstone
M.Sc. (Exercise & Sports Physiology) (Semester-II)
(Credit Based Evaluation and Grading System)

**SHL451: ELECTROCARDIOGRAPHIC INTERPRETATION**

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

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**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
   - 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?
SECTION C

Abnormal heart electrophysiology

1. Ectopic foci
   Inherent rates of sinus, atrial, junctional, and ventricular rhythms Premature beats: PAC, 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

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 VO2 (oxygen consumption) protocols on different platform
- Demonstration of ECG and its interpretation
- Demonstration of team performance physiological variables instrument.
M.Sc. (Exercise & Sports Physiology) (Semester-II)
(Credit Based Evaluation and Grading System)

References:

Textbooks:

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.ecglibrary.com/
library.med.utah.edu/kw/ecg/
www.12leadecg.com/full/
M.Sc. (Exercise & Sports Physiology) (Semester-II)  
(Credit Based Evaluation and Grading System)

**SHL452: BASIC NUTRITION**

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

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

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:

Peer-reviewed journals
   The Journal of Nutrition
   The American Journal of Clinical Nutrition
   European Journal of Clinical Nutrition
   British Journal of Nutrition
M.Sc. (Exercise & Sports Physiology) (Semester-II)  
(Credit Based Evaluation and Grading System)  

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

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

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**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.


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

SPL.591: WOMEN HEALTH AND EXERCISE (ELECTIVE)  

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

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

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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
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
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(Credit Based Evaluation and Grading System)

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:

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

**SHL501: CURRENT CONCEPTS IN SPORTS NUTRITION**

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

SECTION D

1. Illegal substances
2. Substances banned by athletic organizations and the IOC: Position Stands
3. Blood Doping
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:

Peer-reviewed Journals:
Journal of the International Society of Sports Nutrition
Journal of Sports Nutrition

Online Resources:
www.sportsnutrition society.org
www.sportsnutritionguide.net

Other:
M.Sc. (Exercise & Sports Physiology) (Semester-III)
(Credit Based Evaluation and Grading System)

SYL502: PRACTICUM IN DIETARY ANALYSIS

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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 modifications
5. Underweight – causes and Dietary modifications
6. Dietary Counseling
   • Special feeding methods (enteral, parenteral) feeding the patients and psychology of feeding.
M.Sc. (Exercise & Sports Physiology) (Semester-III)  
(Credit Based Evaluation and Grading System)

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 – Glomerulonephritis, Nephrotic Syndrome

References:
Textbooks:

Peer-reviewed Journals:
Journal of Nutrition Education and Behavior

Online Resources:
Nutrition Analysis Tool 2.0
http://www.nat.uiuc.edu/
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

World Health Organization, topics on diet and nutrition http://www.who.int/topics/diet/en/
Nutrigrade Software, Song, et al
M.Sc. (Exercise & Sports Physiology) (Semester-IV)
(Credit Based Evaluation and Grading System)

SYL551: SPORTS PSYCHOLOGY

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

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

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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. 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
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:**

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

**SHL551: EXERCISE PRESCRIPTION METHODS**

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**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 VO₂  
   VO₂ 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
M.Sc. (Exercise & Sports Physiology) (Semester-IV)  
(Credit Based Evaluation and Grading System)  

SECTION D  
Other special conditions in the healthy population  
1. Pregnancy  
2. Elderly  
3. Children  
4. Physically handicapped  

References:  
Textbooks:  
Peer-reviewed journals  
ACSM’s Health & Fitness Journal  
Online resources  
www.acsm.org/  
www.nsca-lift.org/  

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

**SYL552: CURRENT CONCEPTS IN SPORTS & FITNESS**

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**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  
2. The Exercise and Physical Activity Pyramid  
   - Role of physical activity and exercise in disease prevention and rehabilitation
M.Sc. (Exercise & Sports Physiology) (Semester-IV)
(Credit Based Evaluation and Grading System)

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:
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/