FACULTY OF SPORTS MEDICINE & PHYSIOTHERAPY

SYLLABUS

FOR

M.D. IN SPORTS MEDICINE

Examination: 2016

GURU NANAK DEV UNIVERSITY
AMRITSAR

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      (ii) Subject to change in the syllabi at any time.
          Please visit the University website time to time.
I. Biomechanics

- Nature and importance of Biomechanics in Sports Physiotherapy.
- Principle of Biomechanics.
- Biomechanics of shoulder and shoulder girdle motion, elbow motion, wrist and hand motion.
- Biomechanics of pelvic motion, hip motion, knee motion, ankle & foot motion
- Biomechanics of spinal motion.
- Gait analysis
- Biomechanics of rowing, throwing, swimming, jumping and landing, running and other sports.

II. Sports Psychology

- **History and current status of Sports Psychology.**
- **Personality Assessment and sports personality.**
  a. Theories of personality
  b. Personality assessment
- **Attention and perception in sports.**
  a. Attention
  b. Perception
- **Concentration training in sports.**
  a. Basic principles of concentration
  b. Concentration training
  c. Concentration awareness exercises
- **Motivational orientation in sports.**
  a. Athlete’s needs of motivation
  b. Motivational inhibitors
  c. Motivational techniques
- **Pre-competitive anxiety.**
  a. Source of PCA
  b. Effect of PCA on performance
- **Relaxation Training.**
  a. Definition
  b. Types of relaxation trainings
    i) Progressive muscle relaxation
    ii) Breathing exercises
    iii) Yognidra
    iv) Transcendental meditation
Syllabus for MD (Sports Medicine)
2nd Year

- **Aggression in sports.**
  - a. Theories of aggression
  - b. Management of aggression

- **Role of Psychology in Dealing with injuries.**

- **Eating disorders.**
  - a. Etiology of eating disorders
  - b. Types of eating disorders
  - c. Complications of eating disorders

- **Goal setting**
  1. Psychological aspect of doping
     - a. Psychological preparation of elite athletes
     - b. Concept of psychological preparation
     - c. Biofeedback training
     - d. Mental imagery
     - e. Stress management
       - i) Principles of Stress Management
       - ii) Stress Management techniques

- **Group Behaviour and leadership**
  - 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.

- **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:**
Students will undergo practical training at Sports Psychology Lab, Exercise Physiology Lab, and Kinanthropometry equipment for body composition analysis, Somatotyping and age determination and on Biomechanical Principles.
III. Physical Medicine

- **Rehabilitation and Therapeutic Exercises**
  1. Define Rehabilitation, Goals and Objectives of Rehabilitation in Sports, Clinical Evaluation phases of rehabilitation. (multidisciplinary approach)
  2. Prehabilitation
  3. Modern concepts in rehabilitation.
  4. Definition, details of effects and uses of therapeutic exercises.
     a. Dynamic Exercises
     b. Plyometric Exercises
     c. Isokinetic Exercises
     d. Manipulative Techniques
     e. Kinetic chain exercises

- **Mobilization and Strengthening Techniques**
  1. Factors affecting the joint range of motion prevention of stiffness, methods of joint mobilization.
     a. Testing for tightness and contracture of soft-tissue structures.
     b. Techniques of mobilizing the various joints of the body.
  2. Types of Muscle Contractions and Muscle work, Strength of Muscle Contraction in terms of Motor units, Group action of muscles and its implication in designing an exercise program.
     b. Techniques of strengthening with respect to regional consideration.
     c. Various methods of progressive resisted exercise.
     d. Aquatic therapy in sports.

- **Neuromuscular Training**
  1. Neoromuscular control, methods for improving neuromuscular control, proprioception and Kinesesthetic sensation following different sport injuries.
  2. Principles and application of neuromuscular facilitation techniques including PNF in sports.

- Health club & fitness: Concept, group therapy
- Physical Therapy and law: Medico legal aspects of physiotherapy, liability, negligence, malpractice, licensure, work man compensation
- Morale and Ethics: Ethical Analysis of moral problem, ethical issues in physiotherapy

**Practicals:**
The students will undergo clinical training in Departments Orthopaedics, Cardiology, General Medical and Emergency Care
Syllabus for MD (Sports Medicine)
2nd Year

**Sports Physical Therapy**

- **Massage**  
  Historical development, Definition and classification of massage techniques, Physiological effects of massage, Description of the techniques of the classical massage. Connective tissue massage, physiological basis of sports massage and various categories, underwater massage, mechanical devices of massage, therapeutic applications and contraindications of massage.

- **Heat Therapy**  
  Production, Physiological effects, indications, contraindications and specific uses in sports of the following: Infrared rays, Parafin Wax Bath, Steam Bath, Sauna Bath, Moist Heat Pack, Fluidotherapy, Mud Bath and Pelloids.

- **Hydrotherapy**  
  History & introduction, Effects of simple baths, raising temperature baths, baths with additives, Aromatic baths, Mineral baths, physical baths, Hydroelectric baths, Stammer baths, whirl pool bath, showers and steam showers.

- **Electrotherapy**  
  Principles underlying the application of following modalities with reference to their production, biophysical and therapeutic effects, indications and contraindications and the specific uses in Sports Physiotherapy.
  b. Medium Frequency Current:  IFT, Russian Currents.
  c. High Frequency Currents:  SWD, MWD, Ultrasound, Pulsed Electromagnetic Energy.
  d. Radiations:  LASER, UVR

Recent Advancement in Electrotherapy, Electrodiagnosis and its implications to Sports Physiotherapy.

- **Functional Bandages & Orthotic Aids**  
  e. History and uses of functional bandages, classification according to the time of application, types of bandages, Bandaging techniques and bandaging material, Indications, contraindications athletic shoes and modifications, common orthotic aid and appliances in Sports.

- **Cryotherapy**  
  f. Physiological effects, Use of cold therapy in acute phase, rehabilitative phase, preventive phase of athletic injury, Methods of application, Indications and contraindications

- **Manual Therapy**  
  g. Introduction to manual therapy techniques, joint techniques, manual joint therapy, traction, basic principles of manipulation for various disorders of the spine and extremities.
Syllabus for MD (Sports Medicine)  
3rd Year

Basic Medical Sciences and Research Methodology (BMSRM-P1)

I. Applied Basic Medical Sciences

Applied General Clinical Anatomy

1. Anatomy of the Nerve Injuries
   - Anatomical and Physiological loss resulting from nerve injury.
   - Relaxation of nerves
   - Peripheral nerve entrapment

2. Bodily Habitus
   - Characteristics and its correlation to anatomy

3. Anatomical Angles and stiff joints
   - Anatomical Angles
   - Optimal attitude for stiff joints
   - Snapping joints

4. The pathology of nerve, bones in terms of anatomy
   - Anatomical facts regarding bones
   - Pathological facts
   - Anatomical disturbances in various bone pathologies

5. Anatomical basis of clinical tests
   - All clinical tests associated to sports medicine to be covered

6. Anatomy of certain diseases
   - Headache
   - Infections of the hand
   - Common dislocations
   - Lesions of supraspinatous and subdeltoid bursae
   - Hernias associated with sports persons
   - Low back pain
   - Sciatica
   - Lesions of inter-vertebral disk
   - Abscesses of Spine
Syllabus for MD (Sports Medicine)
3rd Year

**Applied General Physiology**

1. **Blood**
   - The various components of blood
   - Viscosity correlation
   - Oxyhemoglobin Dissociation curves
   - Interrelationship between pressure flow and resistance
   - Pressure volume curves
   - Stress relaxation of vessels

2. **Cardiovascular system**
   - Physical characteristics of systemic circulation
   - Pressure pulses
   - Oxygen demand theory of local blood flow circulation
   - Nervous control of blood circulation
   - Humorous control of blood circulation
   - Mechanisms of arterial pulse regulation
   - Hypertension
   - Cardiac output and its regulation
   - Cardiac output in normal stress conditions
   - Methods of measuring cardiac output
   - Normal coronary blood flow along with variations
   - Physiological basis of ischemic heart disease
   - The cardiac reserve
   - Physiological causes of shock

3. **Neuromuscular System**
   - Basic physics of membrane potentials
   - Recording of membrane potentials and action potentials with basics of Electromyogram
   - Mechanism of muscle contraction
   - Sources of energy for muscle contraction
   - Neural control of movement

4. **Respiratory System**
   - Review of mechanics of respiration
   - Pulmonary volumes and capacities
   - Composition of Alveolar air
   - Transport of oxygen in blood
   - Carbon dioxide in blood
   - Regulation of respiration
   - Methods of studying respiratory abnormalities
Syllabus for MD (Sports Medicine)
3rd Year

5. Temperature regulation
   • Regulation of body temperature

6. Endocrine System
   • Pituitary hormones and their functions
   • Thyroid hormones
   • Adrenocortical hormones
   • Insulin Glucagon hormones
   • Parathyroid hormones

Applied Para Clinical Sciences
Pathology:
   • Inflammation and repair
   • “Failed” healing responses
   • Regional considerations of Inflammation & repair of soft tissue injuries.

Pharmacology:
   • Principles of drug action.
   • Basic pharmacokinetics and Pharmacodynamics.
   • The use of drugs in various musculoskeletal disorders.

Radiology:
   • Basics of radiology including ultrasonography CT & MRI scanning
   • Imaging of the head and neck.
   • Imaging of spine.
   • Imaging of pelvis, hip and thigh.
   • Imaging of Patello Femoral Joint & Knee joint.
   • Imaging of the lower leg, foot and ankle.

II. Research & Educational Methodology
Research Methodology
1. Introduction
   • Importance of research in clinical practice
   • Scientific approach
   • Characteristics
   • Purposes and limitations.
2. Ethical issues in research.
3. Structure, formulation and implementation of a research project
Syllabus for MD (Sports Medicine)
3rd Year

4. **Research questions**
   - Selection and statement of problem
   - Literature review
   - Meta-analysis.

5. **Types of research**
   - Basic and Applied
   - Qualitative & Quantitative
   - Descriptive & Experimental
   - Longitudinal & Cross-sectional

6. **Data Analysis**
   - Statistical Tests of significance
   - Correlation
   - Reliability
   - Validity
   - Parametric and Non-parametric statistics

7. **Experimental Research**
   - Types of Sampling
   - Variables
   - Experimental design
   - Factorial design

8. **Survey research**
   - Conducting a survey
   - Questionnaires
   - Steps in conducting survey research
   - Epidemiological research

9. **Presentation**
   - Symposia
   - Seminar
   - Conference
   - Journal
   - Thesis
   - Book
   - Key element of scientific writing.
Syllabus for MD (Sports Medicine)
3rd Year

10. Presenting Research
   - Writing and submitting papers
   - Strategies of paper writing
   - Design of paper writing
   - Tactics of paper writing
   - Where to publish

Poster presentation of a research paper
   - Preamble
   - Poster space
   - Standard format
   - Planning
   - Design

11. Review of an indexed refereed research paper
   - Evaluating paper scientific merit
   - Providing constructive feedback to the author
   - Typical review formats for reviewing a paper
   - Reasons for rejection

12. Oral Presentations at Conferences/Seminars
   - Preparing presentation
   - Duration of presentation
   - What to present

Educational Methodology
   - Aim, philosophy and issues in physiotherapy education
   - 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.
   - Methods of outcome evaluation
Syllabus for MD (Sports Medicine)
3rd Year

Applied Sports Sciences (ASS-P II)
Assessment, Kinanthrometry and Biomechanics

I. Kinesiology

Introduction

- 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.

Anatomical Concepts in Kinesiology

- 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.
- Physical Properties of bone, cartilage and muscle and functional adaptation under pathological conditions.
- General features of the following bones: Scapula, Ribs, Vertebrae, Bones of skull, Humerus, Radius, Ulna, Hip bone, Femur, Tibia and Fibula, Bones of hands and feet.
- Joints: Definition and Classification of joints: Shoulder, Elbow, Knee, Ankle, Intervertebral joints, wrist joint, small joints of hand and foot.
- Origin, insertion, nerve supply and action of all important muscles related to human movement.
- Motion, type of motion, Distance and speed, Displacement and velocity, Acceleration, Angular distance and Angular displacement, Angular Speed, Angular Velocity, Angular Acceleration, Inertia, mass, weight, Newton’s Laws of motion, Units in linear and angular motion.
- Force and its characteristics, internal and external forces, Classification of force system, Composition and resolution of forces. Friction, impact, elasticity, principles of spin and rebound, Eccentric forces. Couple, moment, Principles of Lever, Rotatory force, Gravity, Methods of finding centre of gravity, Principles of Equilibrium, Fluid mechanics, principles of projectile.
II. Assessment & Evaluation in Sports Medicine

- Importance of assessment & evaluation, Methods of evaluation – Interview, Clinical Examination, Reliability & Validity of the tests, Investigative Procedures, Field Tests.
- Evaluation of Physical Fitness:
  - Principles of assessment and prescription of exercise programs
  - Evaluation of Physical Fitness
  - Preliminary Health Screening and Classification of Risk Factors
  - Assessment of Body Composition
  - Assessment of Flexibility and designing stretching programs
  - Assessment of cardio-respiratory fitness
  - Assessing and Managing Stress
  - Assessing strength and muscular endurance
- Assessment of lower limb complex: Pelvis, hip, thigh, knee, leg, ankle and foot
  - Assessment of upper limb complex: Shoulder girdle, shoulder, arm, elbow, forearm, wrist and hand.
- Assessment of spinal column: Cervical, thoracic and lumboscaral, Tests of neural tension.
- Assessment of Gait deviations
- EMG evaluation, diagnostic and kinesiological
- Pre Participation Evaluation of Participants in Sports

III. Kinanthropometry

- Introduction
  - Significance of kinanthropometric knowledge in sports medicine.
- Age determination
  - Skeletal age
  - Dental age
- Body measurements
  - Gross size and mass
  - Lengths or heights of body parts
  - Circumstances of body parts
  - Skinfold thickness
- Kinanthropometric study group measurements
  - Planes of the body
  - Axes of the body
  - Landmarks on the body
Syllabus for MD (Sports Medicine)
3rd Year

- **Body proportions**
  - i. Body mass index
  - ii. The phantom stratagem
  - iii. The Z – scores
  - iv. The O – scale system

- **Body composition**
  - Different Body composition
  - Various methods to estimate body composition
    - i. Water displacement method
    - ii. Under water weighing methods
    - iii. Kinanthropometric determination of the body composition (skinfold thickness)
    - iv. Application of surface anthropometry (the body profile)
    - v. Bioelectrical impedance analysis
    - vi. Ultrasound assessment of fat
    - vii. Arm X-ray assessment of fat
    - viii. Computed tomography (CT) assessment of fat

- **Somatotyping**
  - Sheldon’s method of somatotyping
  - Critical evaluation of Sheldon’s method of somatotyping
  - Heath – Carter method of somatotyping
    - rating scales
    - Kinanthropometric measurements
    - First, Second and Third Components
    - Somatotyping
    - Somatotype distribution

- **Growth, maturation and physical performance**

**IV. Biomechanics**

- Nature and importance of Biomechanics in Sports Physiotherapy.
- Principle of Biomechanics.
- Biomechanics of shoulder and shoulder girdle motion, elbow motion, wrist and hand motion.
- Biomechanics of pelvic motion, hip motion, knee motion, ankle & foot motion
- Biomechanics of spinal motion.
- Gait analysis
- Biomechanics of rowing, throwing, swimming, jumping and landing, running and other sports.
V. Exercise Physiology and Nutrition

- **Nutrition**
  i. Carbohydrates, Fats, Proteins.
  ii. Vitamins, Minerals and Water.
  iii. Optimal Nutrition for exercise.
  v. Pre-Game meal, Carbohydrate loading.
  vi. Alcohol, Mega Vitamin Therapy.
  vii. Food for various athletes of different disciplines.
  viii. Fluid and energy replacement in prolonged exercise.

- **Energy Transfer for Physical activity:**
  i. Energy transfer in Body.
  ii. Energy transfer in exercise.
  iii. Energy expenditure during various activities.
  iv. Fatigue.
  v. Biochemical responses to endurance training.

- **Cardio Vascular System and Exercise:**
  i. Athletes Heart.
  ii. Cardio Vascular adaptations to sustained aerobic exercises.
  iii. Lipids and sports, protection from coronary heart disease, exercise and optimization of lipid profile.
  iv. Sudden cardiac death in sports.
  v. Regulation of circulation during exercise.

- **Exercise and Respiratory System:**
  i. Air Conditioning.
  ii. Second Wind.
  iii. Oxygen Debt.
  v. Athletes Lung.
  vi. Regulation of Respiration during exercise.

- **Skeletal System:**
  i. Growth and Exercise.
  ii. Repair and adaptation during exercise.
  iii. Pathophysiology of Back.
  iv. Training for Muscular Strength and Endurance.
Syllabus for MD (Sports Medicine)
3rd Year

- **Gastrointestinal Tract and Endocrine system:**
  i. Effect of Sports on GIT and Liver.
  ii. Hormone regulation of fluid and electrolytes during exercise.
  iii. Exercise and Menstrual Cycle.
  iv. Stress Hormones in Exercise.
  v. Effects of exercise on various Hormones in the body.
  vi. Opioids, Runners High.

**Applied Exercise Physiology**

- **Body Composition**
  i. Composition of Human Body.
  ii. Somatotyping.
  iii. Techniques of Body Composition Analysis.

- **Aging and Exercise**
  i. Aging and Physiological function.
  ii. Exercise and Longevity.
  iii. Coronary Heart Disease and Exercise.
  iv. Exercise Stress Testing for Diagnosis of CHD.
  v. Exercise prescription for healthy aged.
  vi. Exercise prescription for sedentary adults.

- **Temperature Regulation**
  i. Heat Balance.
  iii. Effects of Climate.
  iv. Effects of Exercise on Temperature Regulation.
  v. Limit of Tolerance of Heat.
  vi. Acclimatisation.
  viii. Exercises in cold.

- **Misc. Topics**
  i. High Altitude Training.
  ii. Sports Diving, Hazards of underwater environment.
  iii. Special Aids to Athletic Performance:- MORA, Oxygen Inhalation, Sleep.
  iv. Sex and performance.
  v. Assessment of Age.
  vi. Muscle tissue fibre typing and its significance.
  vii. Exercise for mood enhancement & anxiety.
Syllabus for MD (Sports Medicine)
3rd Year

Physiological Basis and Principles of Training and Conditioning

- Principles of endurance and strength training
  i. Recovery training intensities in heart rate
  ii. Manipulation of training principles
  iii. Training sub-phases

- Fundamentals that aid training and performance
  i. Warm up and Cool down
  ii. Flexibility and stretching
  iii. Missing workouts
  iv. Overtraining

- Analysis of Training

VI. Sports Psychology

- History and current status of Sports Psychology.
- Personality Assessment and sports personality.
  i. Theories of personality
  ii. Personality assessment
- Attention and perception in sports.
  i. Attention
  ii. Perception
- Concentration training in sports.
  iii. Basic principles of concentration
  iv. Concentration training
  v. Concentration awareness exercises
  a. Motivational orientation in sports.
    vi. Athlete’s needs of motivation
    vii. Motivational inhibitors
    viii. Motivational techniques

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

- **Aggression in sports.**
  a. Theories of aggression
  b. Management of aggression

- **Role of Psychology in Dealing with injuries.**

- **Eating disorders.**
  a. Etiology of eating disorders
  b. Types of eating disorders
  c. Complications of eating disorders

- **Goal setting**

2. Psychological aspect of doping
  a. Psychological preparation of elite athletes
  b. Concept of psychological preparation
  c. Biofeedback training
  d. Mental imagery
  e. Stress management
     i) Principles of Stress Management
     ii) Stress Management techniques

- **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.

- **Emotion**
  i. Meaning of emotion.
  ii. Characteristics of emotion.
  iii. Meaning of controlling and training of emotions and its importance.
  iv. Contribution of sports to emotional health.
  v. Meaning of sentiment, its type, importance and formation.

*Practicals:*
Students will undergo practical training at Sports Psychology Lab, Exercise Physiology Lab, and Kinanthropometry equipment for body composition analysis, somatotyping and age determination and on Biomechanical Principles
Clinical Sports Medicine (CSM – PIII)

I. Non Traumatic Medical Conditions

Illness, Infections, Hypertension, Urine abnormalities; Venereal Diseases; Exercise induced Asthma; Anemia, Delayed onset muscle soreness (DOMS), Runner’s high & exercise addiction. G.I.T. Diseases, Exercises and congestive heart failure, exercise for post coronary & by pass patients, exercise for diabetics.

Diagnosis and management of skin conditions of Athletes, Bacterial infections, Fungal infections, Viral infections, boils and cellulitis.

- Female Specific problems
  2. Injury to female reproductive tract.
  4. Sex determination.
  5. Exercise and pregnancy.

- Common Diseases: Common Cold, Diarrhoea, Dysentery, Typhoid, Cholera, Amoebiasis, Food Poisoning, Tuberculosis, Malaria, Hepatitis etc.

- AIDS in sports people.
- Rheumatology & Geriatric disorder
  1. Rheumatoid arthritis, SLE and Juvenile Rheumatoid Arthritis.
  2. Ankylosing Spondylitis.
  3. Rheumatology out patient clinic.
  4. Osteoarthritis and other geriatric conditions.

- Age Specific Problems
  1. Issues in the adolescents and children involved in sports
  2. Issues in The Geriatric athletes

Medical Aspects of Sports Medicine

- Exercise and Common Pulmonary Conditions
  a. Exercise induced bronchial obstruction
  b. Exercise in chronic airway obstruction
  c. Air pollution and exercise
Syllabus for MD (Sports Medicine)
3rd Year

- **Exercise and Cardiac Conditions**
  a. Exercise prescription for heart disease
  b. Exercise in primary prevention in ischemic heart disease
  c. Exercise for secondary prevention of ischemic heart disease

- **Doping in Sports**
  a. List of banned drugs: their effects and side effects
  b. Guidelines of sample (urine and blood) collection for dope testing
  c. Methods of Drug testing
  d. Relevance of Therapeutic use exemption in doping
  e. Latest trends in doping
  f. Performance enhancing supplements in sports and international regulations

- **Diabetes and Exercise**
  a. Exercise in diabetic patients
  b. Exercise as a method of control of diabetes

- **Exercises for special categories**
  a. Child and adolescent athlete’s problems
  b. Special problems of older athletes
  c. Special concerns for handicapped athletes

- **Misc. Conditions**
  a. Hazards of cold water
  b. Exercise for mood enhancement
  c. Vitamins and exercise
  d. Spinal deformity and sports
  e. Time zone shift and sleep deprivation problems
  f. Exercise in pregnancy and post partum

*Emergency Care and Cardiopulmonary Therapeutics*

- Cardio pulmonary Resuscitation
  1. Shock management
  2. Internal and External bleeding
  3. Splinting
  4. Stretcher use-Handling and transfer
  5. Management of Cardiac arrest
  6. Acute asthma
  7. Epilepsy drowning
  8. Burn
  9. Heat stroke and Heat illness
Syllabus for MD (Sports Medicine)
3rd Year

- Health club & fitness Concept, use and misuse of equipment
  1. Group therapy
  2. Sauna bath
  3. Prevention and rehabilitation of heart attack and diabetes, asthma

- Basics of Cardiac Rehab.
  1. Administration of gases and gas mixtures
  2. Humidity aerosol treatment
  3. Oxygen therapy
  4. Theory of application of mechanical ventilation
  5. Interpretation of Arterial blood gases
  6. Description of ventilators and relationship of therapeutic procedures to underlying pathology
  7. Cause – effect relationships for acid – base disturbances
  8. Basic understanding of invasive monitoring in the intensive care unit setting
  9. Knowledge about drugs lowering
     a. Cholesterol
     b. Hypertension
  10. Knowledge about sedatives

II. **Sports Traumatology**

- Pre-participation examination
- Causes & Mechanism of Sports Injuries, prevention of sports injuries
- Common acute and overuse injuries of:
  a. Shoulder girdle, Shoulder, Arm, Elbow, Forearm, Wrist & hand
  b. Pelvis, hip, thigh, knee, leg, ankle & foot
  c. Spine
  d. Head
  e. Sporting emergencies & first aid and pharmacological treatment of injuries in the athletes
- Cardio pulmonary Resuscitation; Shock management, Internal and External bleeding, Splinting, Stretcher use-Handling and transfer, Management of Cardiac arrest, Acute asthma, epilepsy, drowning, burn, Medical management of mass participation. Heat stroke and Heat illness.
- Sports specific injuries, with special emphasis on the specific risk factor, nature of sports, kind of medical intervention anticipated and prevention with respect to individual sports
  - Individual events: Field & Track
  - Team events: Hockey, Cricket, Football
  - Contact and Non-contact sports
  - Water sports specific injuries
- Over Use Training in Sports
III. Physical Medicine

- **Rehabilitation and Therapeutic Exercises**
  1. Define Rehabilitation, Goals and Objectives of Rehabilitation in Sports, Clinical Evaluation phases of rehabilitation. (multidisciplinary approach)
  2. Prehabilitation
  3. Modern concepts in rehabilitation.
  4. Definition, details of effects and uses of therapeutic exercises.
     i. Dynamic Exercises
     ii. Plyometric Exercises
     iii. Isokinetic Exercises
     iv. Manipulative Techniques
     v. Kinetic chain exercises

- **Mobilization and Strengthening Techniques**
  3. Factors affecting the joint range of motion prevention of stiffness, methods of joint mobilization.
     i. Testing for tightness and contracture of soft-tissue structures.
     ii. Techniques of mobilizing the various joints of the body.
  4. Types of Muscle Contractions and Muscle work, Strength of Muscle Contraction in terms of Motor units, Group action of muscles and its implication in designing an exercise program.
     i. Causes of muscle weakness. Prevention of disuse atrophy, Principles of treatment to increase muscle strength and function.
     ii. Techniques of strengthening with respect to regional consideration.
     iii. Various methods of progressive resisted exercise.
     iv. Aquatic therapy in sports.

- **Neuromuscular Training**
  i. Neuromuscular control, methods for improving neuromuscular control, proprioception and Kinesthetic sensation following different sport injuries.
  ii. Principles and application of neuromuscular facilitation techniques including PNF in sports.

• Health club & fitness: Concept, group therapy
• Physical Therapy and law: Medico legal aspects of physiotherapy, liability, negligence, malpractice, licensure, work man compensation
• Morale and Ethics: Ethical Analysis of moral problem, ethical issues in physiotherapy

**Practicals:**
The students will undergo clinical training in Departments Orthopaedics, Cardiology, General Medical and Emergency Care
Syllabus for MD (Sports Medicine)
3rd Year

(SPTCCFH – P IV)

I. Sports Physical Therapy

• **Massage**
  Historical development, Definition and classification of massage techniques, Physiological effects of massage, Description of the techniques of the classical massage. Connective tissue massage, physiological basis of sports massage and various categories, underwater massage, mechanical devices of massage, therapeutic applications and contraindications of massage.

• **Heat Therapy**
  Production, Physiological effects, indications, contraindications and specific uses in sports of the following: Infrared rays, Parafin Wax Bath, Steam Bath, Sauna Bath, Moist Heat Pack, Fluidotherapy, Mud Bath and Pelloids.

• **Hydrotherapy**
  History & introduction, Effects of simple baths, raising temperature baths, baths with additives, Aromatic baths, Mineral baths, physical baths, Hydroelectric baths, Stammer baths, whirl pool bath, showers and steam showers.

• **Electrotherapy**
  Principles underlying the application of following modalities with reference to their production, biophysical and therapeutic effects, indications and contraindications and the specific uses in Sports Physiotherapy.
  i. Low Frequency Current: Direct Current, Modified Direct Current, Alternative Current, Diadynamic Current, Iontophoresis TENS, High Voltage, Pulsed Galvanic Stimulation.
  ii. Medium Frequency Current: IFT, Russian Currents.
  iii. High Frequency Currents: SWD, MWD, Ultrasound, Pulsed Electromagnetic Energy.
  iv. Radiations: LASER, UVR

Recent Advancement in Electrotherapy, Electrodiagnosis and its implications to Sports Physiotherapy.

• **Functional Bandages & Orthotic Aids**
  History and uses of functional bandages, classification according to the time of application, types of bandages, Bandaging techniques and bandaging material, Indications, contraindications athletic shoes and modifications, common orthotic aid and appliances in Sports.
Syllabus for MD (Sports Medicine)  
3rd Year

- **Cryotherapy**  
  Physiological effects, Use of cold therapy in acute phase, rehabilitative phase, preventive phase of athletic injury, Methods of application, Indications and contraindications

- **Manual Therapy**  
  Introduction to manual therapy techniques, joint techniques, manual joint therapy, traction, basic principles of manipulation for various disorders of the spine and extremities.

**II. Current Concepts in Sports Medicine**

- **Segmental Stabilization Concepts of Spine**  
  a. Muscle function in spinal stabilization  
  b. Contribution of various muscles to spinal stabilization  
  c. Local Muscle dysfunction in Low back pain  
  d. Principles of clinical management of deep muscle system for segmental stabilization

- **Emergency Medical Planning and cover for Sports Events**

- **Exercise for growing bones**

- **Effect of Physical activity intervention in youth**

- **Precision heart rate training**  
  a. Heart rate monitoring and training  
  b. Training in heart zones  
  c. Precision heart rate training for specific sports  
  d. Multi Activity training  
  e. Monitoring of training effects

- **Current concepts in obesity management**  
  a. Childhood obesity etiology and role of exercise  
  b. Obesity correlation with lipidogram  
  c. Intra-abdominal obesity hazards  
  d. Management of obesity

- **Electromyography and Rehabilitation**  
  a. Principles of EMG Rehab  
  b. Muscular tone, fatigue and neural influences  
  c. EMG in the evaluation of Sports Trauma

- **Current concepts in comprehensive physical examination for the instabilities of knee.**

- Current concepts in tendinopathies.
III. Foundations and Principles of Healthcare Management

- Health care management
  a. Definition
  b. Features
  c. Functions
  d. Classification of hospitals

- Organization
  a. Definition
  b. Hospital Organization
  c. Formal and Informal Organization

- Emergency services and disaster management
  a. Emergency Services Scope
  b. Principles of Planning of emergency services
  c. Emergency departments.
  d. Problem areas in emergency departments
  e. Disaster management
  f. Types of hazards / disasters
  g. Disaster plan
  h. Managerial issues in disaster management.

- Technology in health care
  Importance and role of modern technology in hospitals and health care systems.

- Records management
  a. Need and importance of maintaining Medical Records
  b. Administration of a Medical Record Department
  c. Issues and problems of records management in a hospital

- International perspective on health care
  Interrelationship between domestic law and policy and international laws and advocacy.

- Ethics in medical profession
  a. Rights and Duties of Doctors
  b. Rights and Duties of Patients
  c. Professional conduct of the doctors
  d. Codes of conduct
  e. Duties of physicians towards each other
  f. Medical negligence