# Scientific Contents of MD in Sports Medicine

- **Responsible Department:** Sports Medicine
- **Participating Departments:** Anatomy, Physiology, Biochemistry, Pharmacology, Community, environmental and occupational medicine, internal medicine, Orthopedic surgery, and neuropsychiatry departments

## Program structure and contents:

### (a) Program Duration

**Three years to pass Doctoral (MD) degree:**

- **1st part:** One Semester. (6 months)
- **2nd part:** Four Semesters. (Two years)
- **Thesis**: It is registered after passing the first part successfully, for a period of no less than two years (four semesters). It can be discussed 6 months after passing the second part successfully.

### (b) Program structure:

- **Total hours of program:** 65 credit hours
- **Theoretical:** 44 credit hours
- **Practical:** 6 credit hours
- **Thesis:** 15 hours

| The First Part |
|---|
| Anatomy in Relation to sports medicine |
| Physiology in Relation to sports medicine |
| Biochemistry in Relation to Sports Medicine |
| Pharmacology for sports medicine |
| Registering immunizations and drug levels |
| Methods of research and statistics |
| **The Second Part** |
| Internal Medicine in Relation to Sports Medicine |
| Psychiatry in relation to sports medicine |
| Sports medicine for special groups, including women and the disabled |
| Performance Enhancing Drugs and the laws regulating them |
| Biomechanics in sports medicine |
| Sports injuries and physical therapy |

## (c) Teaching plan

## First part (one semester)

### a- Compulsory courses:

| Course Title | Course Code | No. of theoretical hours/week | No. of practical hours/week | Total hours /week | Total teaching hours (one semester) |
|---|---|---|---|---|---|
| Anatomy in Relation to sports medicine | Sms 701 | 2.5 | 1 | 3.5 | 52.5 |
| Physiology in Relation to sports medicine | Sms 702 | 2.5 | 1 | 3.5 | 52.5 |
| Biochemistry in Relation to Sports Medicine | Sms 703 | 0.5 | 1 | 1.5 | 22.5 |
| Pharmacology for sports medicine | Sms 704 | 0.5 | 1 | 1.5 | 22.5 |
| Registering immunizations and drug levels | Sms 705 | 0.5 | 1 | 1.5 | 22.5 |
| Methods of research and statistics | Sms 706 | 0.5 | 1 | 1.5 | 22.5 |
| Total | | 7 | 6 | 13 | 195 |

### b- Elective courses: none

### c- Selective courses: none

## Second part (four semesters)

### a- Compulsory courses:

| Course Title | Course Code | No. of theoretical hours/week | No. of practical hours/week | Total hours /week | Total teaching hours (4 semesters) |
|---|---|---|---|---|---|
| Internal Medicine in Relation to Sports Medicine | **Sms 707** | **15** | **6** | **21** | **1260** |
| Psychiatry in relation to sports medicine | **Sms 708** | **2** | **-** | **2** | **120** |
| Sports medicine for special groups, including women and the disabled | **Sms 709** | **2** | **-** | **2** | **120** |
| Performance Enhancing Drugs and the laws regulating them | **Sms 710** | **2** | **-** | **2** | **120** |
| Biomechanics in sports medicine | **Sms 711** | **2** | **-** | **2** | **120** |
| Sports injuries and physical therapy | **Sms 712** | **12** | **4** | **16** | **960** |
| **Total** | | **35** | **10** | **45** | **2700** |

### b- Elective courses: none.

### c- Selective courses: none.

## Students Assessment Methods

### The First Part

| Course Title | Course Code | Written Exam. | Practical Exam. | Oral Exam. | Clinical Exam. | Total |
|---|---|---|---|---|---|---|
| Anatomy in Relation to sports medicine | Sms 701 | 100 | 25 | 25 | | 150 |
| Physiology in Relation to sports medicine | Sms 702 | 100 | 25 | 25 | | 150 |
| Biochemistry in Relation to Sports Medicine | Sms 703 | 30 | 20 | | | 50 |
| Pharmacology for sports medicine | Sms 704 | 30 | 20 | | | 50 |
| Registering immunizations and drug levels | Sms 705 | 30 | 20 | | | 50 |
| Methods of research and statistics | Sms 706 | 30 | 20 | | | 50 |

## Second part (four semesters)

### a- Compulsory courses:

| Course Title | Course Code | Written Exam. | Practical Exam. | Oral Exam. | Clinical Exam. | Total |
|---|---|---|---|---|---|---|
| Internal Medicine in Relation to Sports Medicine | **Sms 707** | **600** | | **150** | 150 | 900 |
| Psychiatry in relation to sports medicine | **Sms 708** | **70** | | **30** | | **100** |
| Sports medicine for special groups, including women and the disabled | **Sms 709** | **70** | | **30** | | **100** |
| Performance Enhancing Drugs and the laws regulating them | **Sms 710** | **70** | | **30** | | **100** |
| Biomechanics in sports medicine | **Sms 711** | **70** | | **03** | | **100** |
| Sports injuries and physical therapy | **Sms 712** | **500** | | **100** | **100** | **700** |

**Third part: Thesis:** Pass or fail according to the committee decision and approved by department council, Faculty council and University council.

# Anatomy in Relation to sports medicine

(1GENERAL ANATOMY

Bones :- Functions , classifications , structure of living bone , general features , growth and blood supply

-Cartilages : general features ,types

-Joints :classifications (fibrous , cartilaginous , synovial ) , types ofsynovial joints , structure of synovial joints , movements

-Skeletal muscles : characters , functions

-Fascia : types , characters , derivatives

-Spinal nerves : classification , origin ,course and structure

(2NECK AND TRUNK

-Muscles of facial expression , muscles of mastication and tempromandibular joint (T.M.J.)

-Muscles of neck :suprahyoid & Infrahyoid muscles , scalene muscles, prevertebral muscles , muscles of back of neck

-Joints , ligaments and movements of vertebral column

-Nervs of head and neck :-Cranial nerves ,cervical plexus

(3UPPER, LOWER LIMBS AND THORAX

Upper limb :--Muscles of: pectoral region , shoulder ,back of trunk ,arm ,forearm and hand

-Joints ,ligaments and movements of upper limb

-Nerves : brachial plexus ,nerves of upper limb

*Lower limb :-Muscles of : front ,medial and back of the thigh ,gluteal region , popliteal fossa , front and back of leg, dorsum and sole of foot

-Joints and ligaments ,movements of lower limb

-Nerves :Sacral plexus , sciatic ,tibial ,common peroneal , femoral obturator , deep peroneal , superficial peroneal nerves

*Segmental innervations (dermatomes)of the head ,neck ,trunk and limbs

*Mechanism of walking ,transmission of body weight ,hand grip

Thorax :--Thoracic wall : intercostal muscles and intercostal nerves - Diaphragm, mechanism of respiration

-Heart ,Pericardium

-Mediastinum : divisions and contents

-Nerves :phrenic nerves , vagi ,recurrent laryngeal nerves ,thoracic part of sympathetic chain

(4NEUROANATOMY

Cerebral hemisphere :Cerebral cortex , basal ganglia , diencephalon , internal capsule

-Brain stem : midbrain , pons , medulla oblongata

-Cerebellum , Spinal cord
-Blood supply : cerebral arteries ,vertebral artery and basilar artery , internal cerebral veins ,basal vein & great cerebral vein
-Meninges , C.S.F. (sources and circulation)
-Vertebral canal , intervertebral foramina , Sacral canal & cauda equina

## Physiology in Relation to sports medicine

**Contents**

**1- practical**

1-Muscle functioning testing ( including isometric

, isokinetic and isotonic muscle function tests )

2- Electromyographic ( EMG ) analysis of muscle function

3- Muscle biopsy techniques and interpretation of results

4- Lung function testing at rest and during exercise

5- Exercise testing to assess the cardiovascular response to exercise and analysis of oxygen consumption

**Lectures**

Structural properties of the muscle
Physiology of muscle contraction
muscle metabolism
skeletal muscle blood flow and muscle fatigue
metabolic adaptation to training
EMG activity and muscle function
Neurophysiology of movement
Gas exchange
Oxygen transport by blood
Carbon dioxide transport in the blood
Pulmonary function testing
Ventilatory response during exercise
Control of breathing
Cardiac output
Arterial blood pressure
cardiovascular response to exercise
Cardiac reserve and cardiac work
Control of heart function at rest and during exercise
Myocardial adaptation to exercise training

# Biochemistry in Relation to sports medicine

## Contents



## Tutorials:

1. Acidosis and alkalosis
2. Diabetes Mellitus, galactosemia & glycogen storage disease.
3. Hyperlipidemia.
4. Hypercholesterolemia and atherosclerosis.
5. ketosis.

6. Plasma enzymes & their diagnostic values
7. Mineral metabolism: Calcium & phosphate homeostasis, sodium, potassium, iron, zink and their deficiency manifestation.
8. Nucleic Acids: structure, functions and protein biosynthesis, DNA structure, DNA replication, protein biosynthesis, DNA damage & repair.
9. Structure and functions of RNAs, transcription and post-transcriptional modification.
10. Recombinant DNA Technology: PCR, restriction endonucleases, cloning, gene preparation, vectors, formation of recombinant DNA, applications of recombinant DNA, Gene therapy.
11. Cell cycle & apoptosis.
12. Tumor markers.
13. Liver & kidney function tests.
14. Body fluids: Urine and CSF: normal and abnormal constituents & their clinical relevance
15. Biotransformations, the cytochrome P-450.

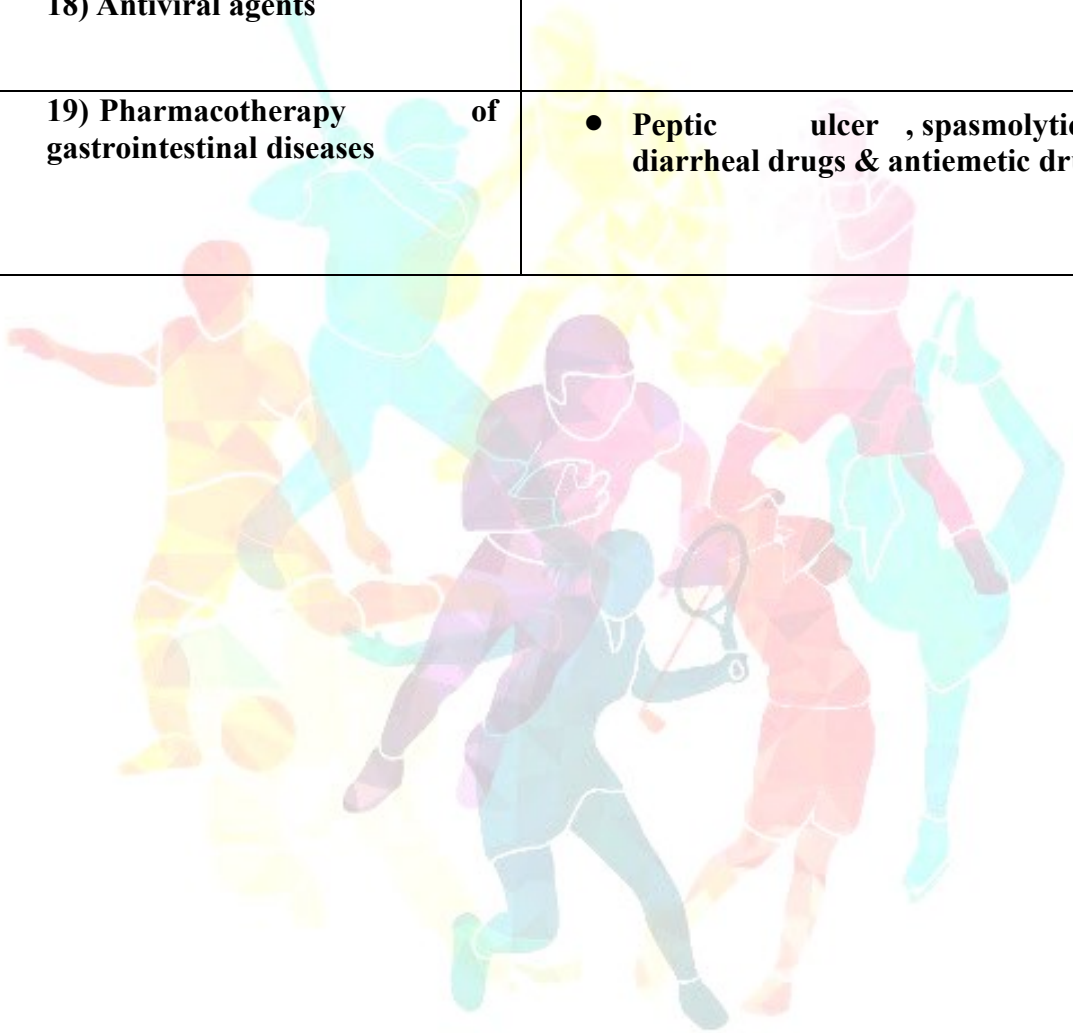
## Pharmacology in Relation to sports medicine

## Course contents

| | |
|---|---|
| **1) General Pharmacology** | • **Drug forms & rout of drug administration**<br>• **Basic principles of pharmacokinetics**<br>• **Basic principles of pharmacodynamics**<br>• **Adverse effects of drugs**<br>• **Drug interactions** |

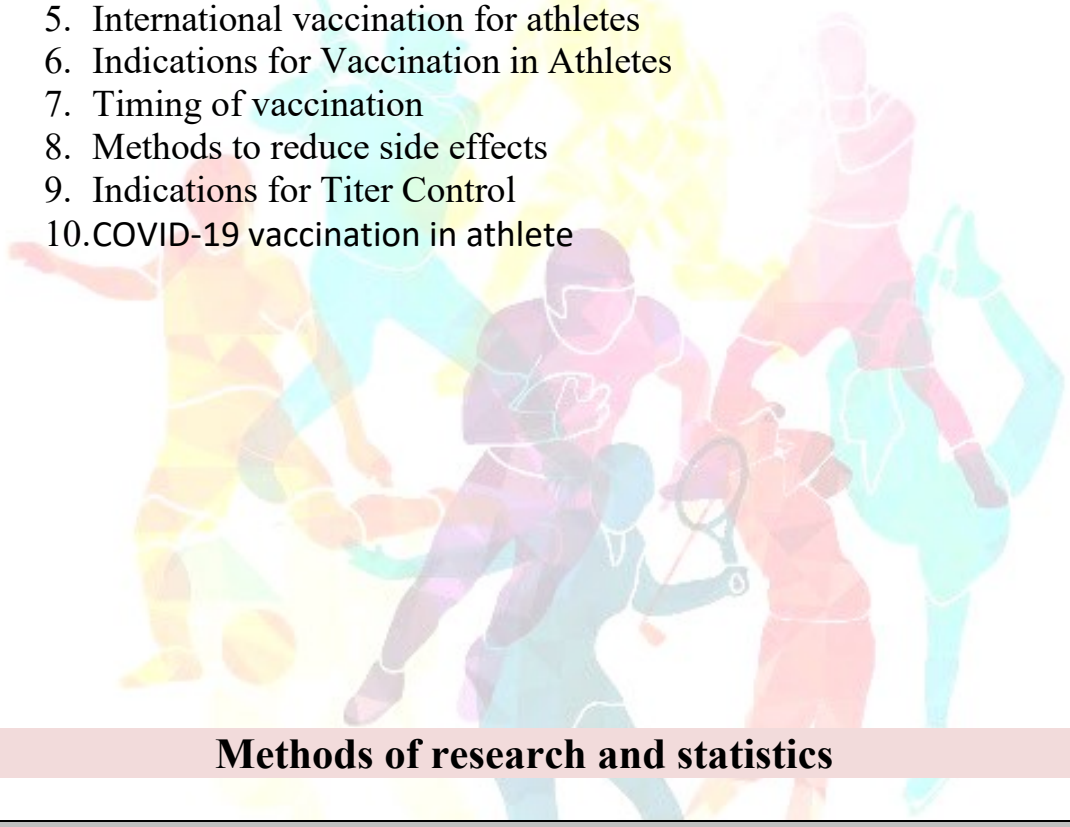
| | |
|---|---|
| 2) Pharmacotherapy pain & analgesic | • Antipyretic & anti inflammatory drugs<br>• Central analgesics – opioids |
| 3) Pharmacotherapygout | • Hypo uricemic & anti gout drugs |
| 4) Pharmacology ofautonomic nervous system | • Cholinergic & a transmission |
| 5) Pharmacology of skeletal muscle | • Muscle relaxants |
| 6) Local & general anesthetic drugs | |
| 7) Pharmacotherapyepilepsy of | Anti epileptic & anti convulsivedrugs |
| 8) Cardiac pharmacology | Positive inotropic drugs , antianginal & anti arrhythmic drugs |
| 9) Pharmacotherapy of hypertension | Anti hypertensive drugs |
| 10) Pharmacotherapy of dyslipidemias | Lipid lowering drugs ( hyperlipidemic ) |
| 11) Pharmacology of hemostasis & coagulation | |
| 12) Pharmacotherapy of anaemia | |
| 13) Pharmacotherapy ofdiabetes | • Insulin & non insulin anti diabetics |
| 14) Doping controlbanned substances | • Anabolic androgenic steroids , peptide hormones , growth factors &mimetics ,beta-2 agonists . |
| 15) Sport supplementation | |

| | |
|---|---|
| **16) Chemotherapeutic drugs** | • **Antibiotics** |
| **17) Antifungal agents** | |
| **18) Antiviral agents** | |
| **19) Pharmacotherapy of gastrointestinal diseases** | • **Peptic ulcer , spasmolytic, anti diarrheal drugs & antiemetic drugs.** |



## Registering immunizations and drug levels

1. Basics of immune system
2. Impact of sports on immune system
3. Principles of Vaccination in Athletes
4. Risk benefit balance of vaccination in athletes
5. International vaccination for athletes
6. Indications for Vaccination in Athletes
7. Timing of vaccination
8. Methods to reduce side effects
9. Indications for Titer Control
10. COVID-19 vaccination in athlete



## Methods of research and statistics

| Topics |
|---|
| Types of data |
| Distribution of data |
| Sources of data |
| Collection of data:<br>• Sampling<br>• Screening<br>• Survey |

| |
|---|
| • Epidemiological studies |
| Summarization of data:<br>• Measures of central tendency<br>• Measures of scatter |
| Presentation of data:<br>• Tabular presentation<br>• Graphic presentation<br>• Mathematical presentation |
| Hypothesis testing steps |
| Tests of significance:<br>• Parametric tests<br>• Non parametric tests |



## Internal Medicine in Relation to Sports Medicine

| Topic |
|---|
| **1) NEUROLOGY**<br>- Hemiplegia, |

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| - Paraplegia,<br>- Peripheral neuropathy,<br>- Myopathy,<br>- Cranial nerves,<br>- Parkinsonism. |
| **2) CARDIOLOGY**<br>- Hypertension,<br>- Heart failure,<br>- Pericardial effusion,<br>- Ischemic heart disease. |
| **3) NEPHROLOGY.**<br>- Glomerulonephritis,<br>- Nephrotic syndrome,<br>- Renal failure,<br>- Heamaturia. |
| **4) CHEST DISEASES**<br>- Tuberculosis,<br>- Pleural diseases,<br>- Bronchial asthma,<br>- Chronic obstructive pulmonary disease (COPD),<br>- Interstitial pulmonary disease, |
| **5) BLOOD DISEASES**<br>- Anemia,<br>- Hemorrhagic blood diseases,<br>- Iron overload. |
| **6) ENDOCRINE DISEASES**<br>- Diabetes,<br>- Thyroid diseases,<br>- Suprarenal gland diseases. |
| **7) RHEUMATOLOGY**<br>- Gout |
| **8) ACID-BASE BALANCE** |
| **9) $Na^+$ & $K^+$ ABNORMALITIES** |

## Psychiatry in Relation to sports Medicine

| |
|---|
| 1- **Psychiatry history and mental status** |
| 2-Classification in psychiatry |
| 3- **Mood Disorders** |
| 3- **Anxiety Disorders** |
| 4- **Schizophrenia and other psychotic Disorders** |
| 5-Dissociative Disorders |
| 6- **Alcohol, opioids and other substance related disorders** |
| 7-Somatoform Disorders, Factitious disorders and Malingering |
| 8- Child and adolescent Psychiatry |
| **9- Delirium ,Dementia and Amnestic disorders** |
| Organic mental disorders |
| 11-personality disorders |
| 12-Sleep disorders |
| 13-Sexual dysfunction |
| 14-Eating and impulse control disorders |
| 15-Liaison psychiatry( and covid 19) |
| 16-Psychotherapy |
| Service planning and administration<br>Psychiatric disorders in women<br>Guidelines of management of psychiatric<br>□ Fever in psychiatry |

## Sports medicine for special groups, including women and the disabled

**Women in sports:**

1. Physical differences between the female and male
2. The influence of the male hormone testosterone
3. TRAINING CAPACITY OF WOMEN
4. AEROBIC FITNES
5. INJURIES
6. EXERCISE AND MENSTRUAL FUNCTION
7. Factors associated with menstrual changes in athletes
8. PREGNANCY
9. Nutritional Aspects of Women's Soccer
10. Recommendation For nutrition plan for women athletes

**Disability**

1. Definition of Disability
2. Types of disability
3. Difference between disability, impairment and handicap.
4. Impact of different disabilities on practicing sports.

## Performance Enhancing Drugs and the laws regulating them

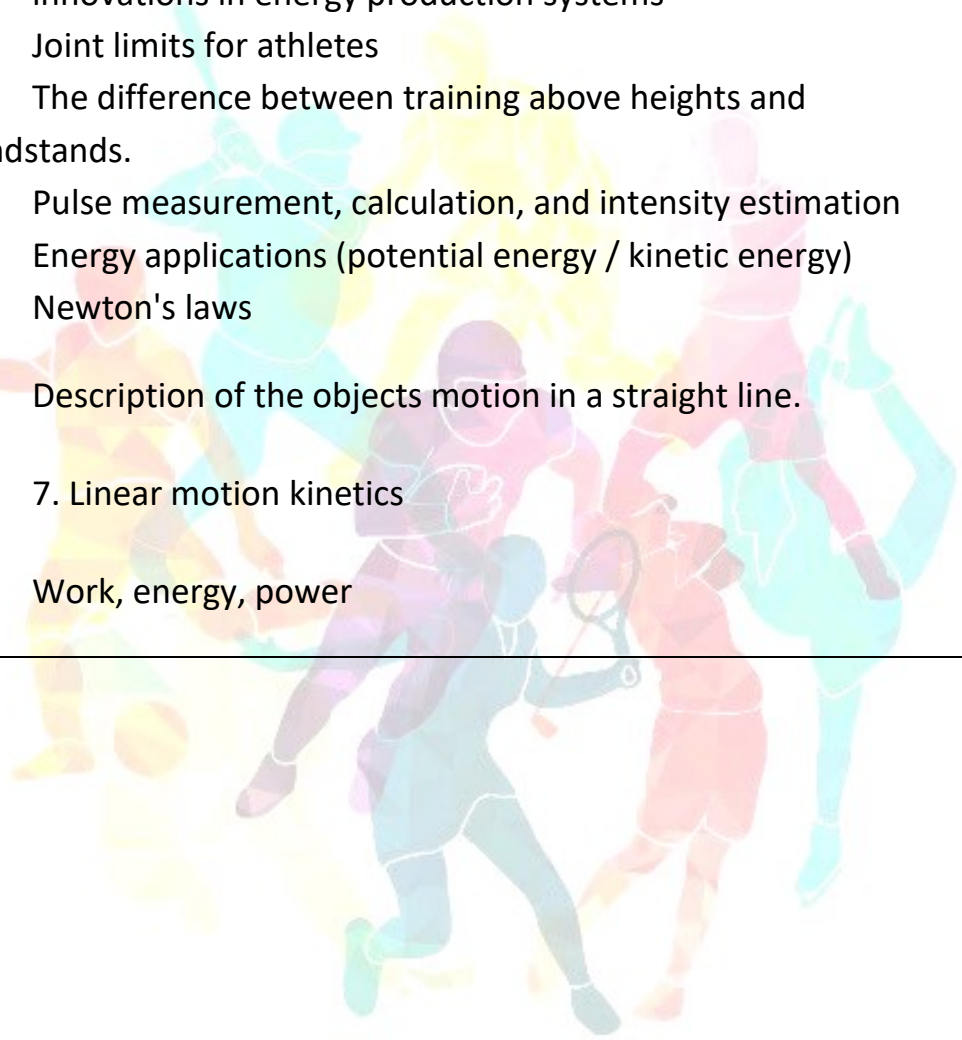
| *Subject* |
| --- |
| *1- Introduction, history & categories of drug Doping( pharmacology of Performance-Enhancing Drugs)* |
| *2- Anabolic androgenic steroids* |
| *3- Hormones and related substances* |
| *4- B2-Agonists & Agents with anti-estrogenic activity* |
| *5-Diuretics and other masking agents* |
| *6- Prohibited methods* |
| *7- Stimulants* |
| *8-Prohibited substances in particular sports* |
| *9- Dietary supplements* |

| |
|---|
| *10- Doping control procedures* |
| *11- Exercise Addiction: The Dark Side of Sports andExercise* |
| *12- Addiction in Retired Athletes* |
| *13- Sudden death in athletes* |
| *14-Concussion in Sports & Posttraumatic Stress inAthletes* |
| *15- Ethical issues and doping control* |

## Biomechanics in sports medicine

1- Biomechanics in the sports field.
2- Terminology used in the study of movement.
3- Basic concepts and principles in mechanics
4- Strength: to maintain equilibrium or to change motion.
5- Kinematics of movement in a straight line.
6- Biorhythm
7- Isokinetic
8- Kinesotape
9- center of gravity
10- ergonomics
11- The area of the field according to the number of players in soccer.
12- Delaying the onset of fatigue for endurance sports.
13- ways to detect an injury amelioration.
14- Player Energy Measuring.
15- warm up
16- movement characteristics

17- locomotor system
18- 3D muscle balance
19- Calculate the level of development of the players.
20- Modern physical exams
21- innovations in energy production systems
22- Joint limits for athletes
23- The difference between training above heights and grandstands.
24- Pulse measurement, calculation, and intensity estimation
25- Energy applications (potential energy / kinetic energy)
26- Newton's laws
27- Description of the objects motion in a straight line.
28- 7. Linear motion kinetics
29- Work, energy, power



## Sports Injuries and Physical Therapy

**Introduction:**

1. Epidemiology
2. General clinical approach
3. general principles of prevention of sports injuries
4. Muscle and soft tissue injuries:
5. Acute soft tissue injuries
6. Prevention of acute muscle injuries in sport

**Knee injuries:**

.1 Clinical assessment of the acutely injured knee in the athlete
.2 Acute injuries of the knee
.3 Functional anatomy of the knee joint
.4 Acute injuries to the anterior cruciate ligament
.5 Acute injuries to the posterior cruciate ligament
.6 Acute injuries of the collateral ligaments of the knee
.7 Acute meniscal injuries of the knee
.8 Acute fractures of the knee
.9 Clinical assessment of the athlete with chronic knee pain
.10 Clinical biomechanics of overuse injuries of the athlete
.11 surgical management of Chronic anterior knee pain in the athlete
.12 surgical management of Chronic medial knee pain in the athlete
.13 Surgical treatment of chronic knee pain in the athlete