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CURRICULUM / STATUTES/ REGULATIONS

FOR 5 YEARS MS ORTHOPEDICS

Faisalabad Medical University

Faisalabad

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Section A

VISION STATEMENT:

Faisalabad Medical University has been established since 05-05-2017 for purpose of imparting better medical education and encouraging and arranging extensive research and publication in the field of medical science. The vision of university is:

“Striving to achieve national and international stature in undergraduate and postgraduate medical education with strong emphasis on professionalism, leadership, community health services, research and bioethics”

MISSION STATEMENT

The mission of the University is:

“Educate Healthcare professionals to prevent, diagnose and treat human illnesses to practice evidence-based medicine with focus on lifelong healthcare in order to meet the challenges of community needs and competitive medical profession at the same time”

STATUTES

Nomenclature

The name of degree programmer shall be MS Orthopedics.

Course Title:

MS Orthopedics

Training Centers

Department of Orthopedics in Affiliated hospitals of Faisalabad Medical University, Faisalabad.

Duration of Course

The duration of course shall be five (5) years with structured training in a recognized department under the guidance of an approved supervisor.

Course structure:

1. **Core knowledge:** Competency based learning for trainees. (2 exams to be conducted by university. Continuous internal assessment to be included throughout the Programme, which is conducted by the department and will carry weightage in final assessment)
2. **Clinical Training** in respective specialty
3. **Research and Thesis writing.**

4. **Mandatory Workshops** throughout the course of programme will be conducted. The basic workshops will be attended by all trainees from all specialties and will be evenly distributed throughout the course:

1. **Communication skills**
2. **Research synopsis and thesis writing skills**
3. **Basic Biostatistics and Research Methodology**
4. **Information Technology Skills**
5. **Initial Life Support (ILS)**

At the end of each workshop, assessment will be done regarding the workshop and certificates will be issued to passing trainees only. The workshops will be conducted by the University and will be paid as in all post-graduate programmes and supervised by the department of Medical Education, FMU, Faisalabad. The trained certified coaches/teachers will be invited and they will get incentive from the university. All the interested trainers will contact the department for inclusion in trainers list.

Feedback of the facilitators will be recorded for the continuation of the process. Medical education department will issue yearly planner for these workshops in the light of curriculum document. University will certify it.

5. Specialty Specific workshops

1. **Basic Surgical skills**

The trainee will have to complete the workshop of Basic surgical skills in the first two years of training before the intermediate examination. The department of Surgery, Faisalabad Medical University, will be responsible for the conduction of this workshop.

Part I: Candidate will start his/her training in orthopedics surgery department from 1st day till 6 months. Candidate will gain basic knowledge of the selected specialty i.e., anatomy, physiology and orientation to the subject, basic principles, history taking and case presentation, inpatient and out-patient care. During this time the candidate will select a topic for synopsis, complete his/her synopsis and will attend the first 2 mandatory workshops.

Part II: From 6 months till 2 Years, he/she will do a rotational training in (General surgery including all compulsory and elective rotations) under a supervisor allocated by the university. The candidate shall undertake clinical training in fundamental concepts of general surgery from 6 months till 2 Years. During this period, the candidate must submit the synopsis for approval and will attend the workshop on Basic Surgical Skills. At the end of 2nd year, the Intermediate examination shall be held in fundamental concepts of General surgery. The clinical training in orthopedics surgery shall be rejoined from 2nd years onwards in orthopedics surgery department.

Part III is structured for 3rd, 4th and 5th calendar years in MS orthopedics. The candidate shall undergo training to achieve educational objectives for MS Orthopedics curriculum along with rotation in relevant fields.

Section B:

Admission Criteria

Central induction Policy as per Government rules

Registration and Enrollment

The number of PG Trainees/ Students and Beds to trainee ratio at the approved teaching site will be as per policy of Pakistan Medical & Dental Council

The University will approve supervisors for MS/MD courses.

Candidates selected for the courses after their selection and enrollment shall be registered with FMU as per prescribed Registration Regulation.

Accreditation Related Issues of The Institution

A. Faculty

Properly qualified teaching staff in accordance with the requirements of Pakistan Medical and Dental Council (PMDC). Supervisors will be decided by the university according to the set standards and rules.

B. Adequate resources

The university will provide adequate resources Including class-rooms (with audiovisual aids), demonstration rooms, computer lab, clinical pathology lab, theaters, instruments

and other equipment etc. for proper Training of the residents as per their course outcomes and objectives.

C. Library

Departmental library should have latest editions of recommended books, reference books and latest journals (National and International).

Freezing of Program & leave Rules:

Freezing of training, Maternity leave, Ex Pakistan Leave and Extra Ordinary Leave etc. would be allocated through the Office of Dean Postgraduate to the competent authority.

Section C:

AIMS AND OBJECTIVES OF THE COURSE

AIM

The aim of five years MS Orthopedic program is to train residents to acquire the competency of a specialist in the relevant field so that they can become good clinicians, teachers, researchers and community health provider in their specialty after completion of their training according to the global standards.

LEARNING OBJECTIVES:

GENERAL OBJECTIVES

The training should enable the resident to:

1. Access and apply relevant knowledge to clinical practice appropriate to patient need.
2. Safe and effective surgical procedures:
 - a) Demonstrate sound surgical skills
 - b) Demonstrate procedural knowledge appropriate to the level of training
 - c) Demonstrate manual dexterity
 - d) Maintain and acquire new skills
 - e) Analyze their own performance
3. Effective management plans:
 - a) Diagnose and Orthopedic problems on the basis of history and clinical examination
 - b) Formulate a well-reasoned management plan based
 - c) Formulate a differential diagnosis based decide proper investigation.

- d) Manage according to sensitivity to their physical, social, cultural and psychological needs
 - e) Recognize nervous system disorder and differentiate those amenable to surgical treatment
 - f) Manage the Orthopedic-trauma.
 - g) Recognize and manage complications
 - h) Interpreting investigations
 - i) Consider all issues relevant to the patient and formulate management plan.
 - j) Integrate new technologies and techniques in management plan.
4. Organize diagnostic testing, imaging and consultation as needed:
- a) Select appropriate investigative tools in cost-effective manner
 - b) Interpret appropriate diagnostic imaging
 - c) Evaluates the advantages and disadvantages of different investigative
5. Communicate effectively:
- a) Communicate appropriate information to patients (and their family) about procedures, risks benefit of different treatment option
 - b) Coordinate with management team / multi-disciplinary team
 - c) Communicate with and co-ordinate health management teams to achieve an optimal surgical environment
 - d) Focus on resolution of misunderstandings or disputes
 - e) Modify communication according to cultural and linguistic sensitivities
6. Ethical issues:
- a) Stick to ethical principles
 - b) Identify ethical expectations that impact on medico-legal issues
 - c) Recognize legal aspects of informed consent and confidentiality

- d) Be accountable for the management
- 7. Professionalism by:
 - a) Applying a critically reflective approach
 - b) Following to regulations concerning workplace harassment
- 8. Collaboration with interdisciplinary team:
 - a) Collaborate with other professionals in decision making
 - b) Employ a consultative approach towards colleagues
 - c) Recognize the need to refer patients to other professionals.
- 9. Management and Leadership
 - a) Learning to keep balance between limited resources and patient care
 - b) Manage and lead clinical teams
 - c) Keep and maintain relevant records
- 10. Health advocacy:
 - a. Promote health maintenance
 - b. Advocate for appropriate health resource allocations

SPECIFIC LEARNING OUTCOMES

On completion of the programmed trainees will have competence in all aspects of the published syllabus, basic Orthopedic surgical care, Orthopedic intensive care, Emergency medicine and Complementary surgical disciplines. Following competencies are expected from the resident;

Didactic Education:

- **Trauma:**
 - i. Diagnose and describe common fractures.
 - ii. Describe an open fracture and its management.

- iii. Diagnose common injuries e.g., such as Colles' fracture, hip fractures, etc.
- iv. Describe the physiologic process of fracture healing and factors fractures infusing the healing.
- v. Laws of Biomechanics
- vi. Identify and describe the complications of major fractures e.g of spine, pelvis etc.
- vii. Describe appropriate diagnostic investigations
- viii. Describe first aid (ATLS) measure
- ix. Define various modes of treatment for closed fractures.
- x. Describe the pediatrics fractures.

- **Spinal Disorders:**

- i. The management of low-back pain, degenerative joint disease, and the herniated lumbar or cervical disc.
- ii. Discuss acute low-back strain
- iii. Diagnose by appropriate historical, physical, radiographic, and laboratory data.

- **Infections of Bones and Joints:**

- i. Discuss the pathology, physiology and natural history of orthopedic infection.
- ii. Discuss the therapeutic management.

- **Pediatric Orthopedics:**

- i. Define the different terms e.g. valgus, equinus etc.
- ii. Diagnose common mal-alignments of the extremities and spine.
- iii. Diagnose congenital dislocations, hip, Legg-Calve-Perthes disease, slipped capital femoral epiphysis, and idiopathic

scoliosis, given necessary historical, physical, and radiographic data.

- **Soft Tissue Disorders:**
 - i. Diagnose common disorders of soft tissue e.g., tendinitis and bursitis etc.
 - ii. Discuss the degenerative arthritis from rheumatoid arthritis.
 - iii. Discuss surgical procedure for treatment of arthritis.
- **Clinical Knowledge:**
 - i. **Cognitive knowledge:** Describe embryology, applied anatomy, physiology, pathology, clinical features, diagnostic procedures and the therapeutics including preventive measure.
 - ii. **Clinical Decision-Making Ability:** Master in history taking, evaluation and investigations and decision making for management plans both conservative and surgical for common disorder
- **Pediatric Orthopedics-** Diagnose congenital and developmental disorders.
- **Orthopedic oncology-** The resident is expected to be familiar with tumors in orthopedic practice. Salvage procedure, chemotherapy, rehabilitation modalities should be learnt
- **Management of Trauma-**
 - i. Resident should be able to recognize, assess and manage all variety of acute orthopedic trauma and its medico legal aspects.
- **Sports Medicine-** A Resident should be familiar with prevention training diagnosis and therapeutic modalities in athlete injury.
- **Physical Medicine and Rehabilitation-** Adequate exposure is mandatory for resident.

- **Orthopedic Neurology-** Student should be able to diagnose and manage cerebral palsy and post-polio residual paralysis
- **Spine Surgery-** The student Should be familiar with various kinds of spinal disorders such as scoliosis, kypho-scoliosis, spinal trauma, PIVD, infections & tumors of spine as regards their clinical presentations and management.
- **Orthopedics Implants** – The Student learns about implants in Orthopedics and their metallurgy.
- **Radiology-** There should be continuous collaboration with Radiology department for interpretation of imaging and different radiological procedure.
- **Psychologic and social aspect- of patients**, especially those terminally ill and disabled-persons and inter acting with their relatives.
- **Teaching:** Acquire ability to teach an MBBS student in simple and straightforward language about the common orthopedic disorders.
- **Preventive Aspect:** Acquire knowledge about prevention of orthopedic disorders especially in children such as poliomyelitis, congenital deformities, cerebral palsy and common orthopedic malignancies.
- **Identification of a special areas** within the subject: Higher skills should be developed within the specialty for e.g., Arthroplasty, Neurology, Arthroscopy oncology, spine surgery, etc.
- **Research Experience:**
 - i. All residents should carry out an academic outcome-based research project during training.
 - ii. The research work shall be compiled in the form of a thesis which should be submitted for evaluation 6 months before end of training.
 - iii.
- **Clinical Skills to be Learnt**
The trainee must be able to demonstrate the following clinical skills:

- i. History of taking,
- ii. Clinical examination
- iii. Orientation of Out-patient, In patient, Accident & Emergency, Operation Theatre and learning resources.
- iv. Recording Keeping and documentation.
- v. Interpretation of X-ray, CT scan, Ultra sound, MRI and Bone Scans.
- vi. Application and removal of Splints and POP casts.
- vii. Application of Traction.
- viii. Administration of Injections / Aspirations.
- ix. Case presentation
- x. Common Medicines used in orthopedics department.
- xi. Application and removal of sutures and dressings.
- xii. Writing investigation requests, calls to other departments, patient progress notes, patient shifting instructions, discharge certificates and Death Reports.yu
- xiii. Pre-operative preparation, per operative conduction and post-operative care of patients.

- **Procedural Skills to be Learnt**

The trainee should be able to demonstrate following procedural skills:

- i. Fracture management
 - a. Closed reduction/casting
 - b. External fixation
 - c. Open reduction
 - d. Internal fixation
 - e. Prosthetic replacement
- ii. Shoulder Procedures

- a. Rotator Cuff Repair
 - b. Arthroscopy
 - c. Humeral head arthroplasty
 - d. Total shoulder replacement
- iii. Upper limb Procedures
 - a. Elbow arthroplasty
 - b. Total elbow replacement
 - c. Total wrist replacement
- iv. Hip Procedures
 - a. Fixation of femoral head fractures
 - b. Total hips arthroplasty
- v. Lower Limb Procedures
 - a. Epiphysis
 - b. Fractures
- vi. Knee Procedures
 - a. Arthroscopy
 - b. Meniscectomy
 - c. Anterior collateral ligament repair
 - d. Total knee replacement
- vii. Orthopedic Instruments:
 - a. Assembly and disassembly of power instruments.
 - b. Use of the pneumatic tourniquet.
- viii. Ankle/Foot Procedures
 - a. Arthroscopy
 - b. Arthrodesis
 - c. Malleolar fracture
 - d. Total ankle replacement

- e. Bunionectomy
- f. Correction of hammer toe
- ix. Miscellaneous
 - a. Amputation
 - b. Disarticulation
 - c. Osteotomy
 - d. Tendon procedures

Content list:

Anatomy

- Applied anatomy of limb and spine will be included.
 - Embryology:
 - Gametogenesis, Oogenesis early embryonic development of limb and spine.
Ossification center and teratogenic of limb and spine.
- Histology
 - Identification of various tissue related to the muscle skeletal system
 - The Connective tissue
 - Tendon structure
 - Cartilage
 - Sponge bone
 - Compact bone
 - Muscular Tissue
- Histological detail of peripheral nerve and spinal cord and cardiac and Neural tissue

GROSS / SURFACE ANATOMY

Study of bones & Muscles

- upper limbs
- Shoulder Girdle
- Lower limb
- Pelvic Girdle
- Spine

2. Study of Nerves

- Brachial Plexus
- Lumber Plexus
- Individual nerve of limbs

3. Study of arteries

- Subclavian
- Brachial
- Radial & Ulnar
- Femoral
- Gluteal
- Obturator
- Popliteal
- Anterior Tibial
- Posterior Tibial

4. Thoracic Wall

- Rib cage
- Intercostal muscles
- Long thoracic and phrenic nerve
- Costal arteries and nerve

5. Joints

- Classification of joints
 - Fibrous
 - Cartilaginous
 - Synovial
 - Plane
 - Hinge
 - Pivot
 - Condylloid
 - Saddle
 - Ball-and-Socket

Cross Sectional / Imaging Anatomy of the Musculoskeletal System:

- **Vertebral Column**
 - Atlas (C1)
 - Axis (C2)
 - Cervical
 - Thoracic

- Lumbar
- Sacrum
- **Thoracic Bones**
 - Rib & Vertebra Articulated
 - Sternum
- **Upper Limb Bones**
 - Scapula (Posterior / Lateral Aspect)
 - Humerus (Proximal / Distal End)
 - Ulna
 - Radius
 - Hand (Dorsal / Palmar Surface)
- **Lower Limb Bones**
 - Femur (Proximal End)
 - Femur (Distal End)
 - Tibia
 - Fibula
 - Foot (Superior / Lateral Aspect)
 - Hip / Knee & ankle Joint
- **Renal function:**
 - Glomerular filtration
 - Tubular function
 - Water excretion
 - Regulation of Na + and K + excretion
 - Homeostatic mechanisms to maintain
 - Tonicity
 - Volume
 - Acid base balanced.

- **Neuro Muscular unit**

- Sensory activity: Peripheral sensory and path ways.
- Motor activity: and pathways of reflex.
- Motor neurons, motor units and neuromuscular junction.

Physiology

Musculoskeletal Physiology

- Introduction
- Muscle types—skeletal, smooth and cardiac
- Shared characteristics
- Skeletal muscle filaments and associated proteins
- Thick filament—myosin
- Thin filament—actin and tropomyosin/troponin complex
- Skeletal muscle filament and associated proteins
- Skeletal Muscle fiber types:
- Contraction cycle
- Function of neuro muscle junction
- Functional unit of a muscle
- Motor unit recruitment
- Sliding filament hypothesis
- Summation and tetanus
- Group action of muscles
- Control of coordination
- Voluntary and reflex movement of muscle
- Muscle training and fatigue

- Energy sources for contraction of muscle
- Biosynthesis and metabolism of the neurotransmitter
- Synthesis—the key metabolic enzyme is choline-O-acetyltransferase
- Neuromuscular transmission
- Toxins and other pharmacological agents that act on the neuromuscular junction
- Myasthenia gravis
- The muscle hypertrophy and atrophy
- Prevention of muscle atrophy
- EMG

Respiration:

- Pulmonary ventilation
- Mechanics of respiration, pulmonary volumes, capacities and pressures.
- Transport and exchange of oxygen and carbon dioxide.
- Regulation of respiration. (Chemical and neural)
- Principles and methods of artificial respiration.
- Cardiopulmonary resuscitation.

Renal function:

- Glomerular filtration
- Tubular function
- -Homeostatic mechanisms to maintain
- Tonicity
- Volume

- Acid Based balanced.

Endocrinology:

- Calcium homeostasis
- Hypo-and hyperactivity of the endocrine glands.
- Endocrinology of the menstrual cycle.
- Hypo-and thyroidism and parathyroidism

Gastrointestinal function:

- Digestion and absorption of water- and fat-soluble vitamins & minerals

Central Nervous System

- Motor cortex corticospinal and corticobulbar system.
- Autonomic Nervous System
- Overall functions of sympathetic and parasympathetic nervous systems.
Autonomic reflex activity.
- Functional Aspects of the Nervous System
- Sensory activity: Peripheral sensory receptors, sensory pathways, physiology of pain and disorders of sensations.
- Motor activity: corticospinal and extra corticospinal pathways, cerebellum and Vestibular system.
- Motor neurons, motor units and neuromuscular junction.
- Reflex activity: Monosynaptic stretch reflexes, polysynaptic withdrawal reflexes, general characters of reflexes.

Pharmacology

- Antibiotics, analgesics, calcium supplements, vitamin-D & vitamin-K supplements pharmacology.

Pathology

Inflammation

- Acute inflammation
- Cellular components and chemical mediators of acute inflammation
- Exudates and transudate
- Sequelae of acute inflammation
- Chronic inflammation
- Etiological factors and pathogenesis
- Distinction between acute and chronic (duration) inflammation
- Histologic hallmarks
- Types of chronic inflammation, non-granulomatous and granulomatous, and their causes

Tumor immunology

- Immunological tolerance, autoimmunity and autoimmune diseases.

Related Microbiology

- Infection source
- Nosocomial infections
- Bacterial growth and death
- Bacteria Pathogenic
- Spores
- Important viruses
- Important parasites and bacteria related
- Surgically important microorganisms
- Asepsis and antisepsis
- Sterilization and disinfection
- Infection prevention
- Personnel protection from communicable diseases

Special Musculoskeletal Pathology

Bones:

- Atrophic and hypertrophic conditions of bones
- Congenital, developmental and hereditary abnormalities of bone and cartilage. Traumatic bony lesions leading to osteoporosis, fractures
- Healing of fracture
- Non-union & malunited fracture
- Pseudoarthrosis
- Bone graft
- Inflammatory and non-inflammatory lesions of bones.

Metabolic Diseases of Bone:

- Scurvy
- Rickets
- Osteomalacia
- Renal dwarfism
- Skeletal changes due to endocrine dysfunction
- Miscellaneous groups of osteopathies
- Secondary pulmonary hypertrophic osteoarthropathy
- Bone cyst
- Polystatic fibrous dysplasias of bone
- Paget's disease of bone
- Simple and malignant tumors of bone and cartilage.

Joints:

- Disease of joints
- Infective arthritis; gonococcal, pyogenic, tuberculosis, syphilitic, mycotic etc. Rheumatic arthritis
- Degenerative joint disease (osteoarthritis).
- Sero-negative and positive polyarthritis
- Lyme disease (Lyme arthritis)
- Bursitis
- Metabolic arthritis: (a) Due to systemic disorders (b) Due to local disorders.

Muscles

- Non-inflammatory myopathies
- Inflammatory myopathies
- Metabolic diseases
- Denervation, muscular atrophy
- Muscular dystrophy
- Myositis
- Myasthenia gravis
- Torticollis
- Dupuytren's contracture
- Tendonitis
- Tumors.

Basic Principles of Surgery for MS Orthopedics

- History taking and clinical examination
- Pre-operative preparation of patient
- Principles of operative surgery
- Operation Theater management including Asepsis, sterilization and antiseptics
- Surgical site infections
- Antibiotic and Antiprotozoal drugs in surgery
- Basics of anesthesia and surgery
- Intensive care of critical patients
- ATLS protocol
- Emergency Management of surgical patients

- Wound management
- Nutrition in surgery patients
- Basics of management of burn patients
- Basics of surgical oncology
- Introduction to laparoscopy and endoscopy
- Introduction to Organ transplantation
- Informed consent and counseling
- Common surgical manifestations e.g cysts, sinuses, fistula etc. and their management
 - Interpretation of radiology in surgery, conventional and advanced, both diagnostic and interventional

Common Surgical Skills Incision of skin and subcutaneous tissue:

- Langer's lines
- Wound healing mechanism

Closure of skin and subcutaneous tissue:

- Technique for closure
- Type of Suture and needle choice
- Safe practice

Knot tying:

Different technique of knot tying

Use of drains:

- Indications
- Types
- Insertion
- Fixation
- Management/removal

Incision of skin and subcutaneous tissue:

Use of scalpel/blade, diathermy and scissors

Closure of skin and subcutaneous tissue:

Different technique and material use for closure

Hemostasis:

- Pressure to control bleeding
- Clip/ artery application
- Suture ligation
- Tie ligation
- Diathermy

Pre-operative assessment and management:

- Respiratory physiology in surgery
- Diabetes mellitus
- Renal failure

- Management of shock
- Sepsis
- Other risk factors / comorbidities

Intraoperative care:

- Safety for communicable diseases
- Sharps
- Electrocutation, laser use
- Infection
- Radiation
- Tourniquets
- Risks of anesthesia

Post-operative care:

- Postoperative monitoring
- Analgesia
- Fluid and electrolyte management
- Detection and Initial management of organ failure
- Complications specific to particular operation
- Critical care

Blood products:

- Components of blood
- Alternatives to use of blood products
- Management of the complications of blood product transfusion including children

Antibiotics:

- Common pathogens in surgical patients
- Antibiotic sensitivities
- Antibiotic adverse-effects and reactions
- Principles of prophylaxis

Technical Skills

- CVP line insertion
- Chest tube placement
- Diagnostic peritoneal lavage
- Bleeding diathesis & corrective measures, e.g. warming, packing
- Clotting mechanism; Effect of surgery and trauma on coagulation
- Bleeding Disorders and their detection and management
- Deep venous thrombosis and thromboembolism
- Anticoagulation
- Role of V/Q scanning, CT angiography and thrombolysis
- Place of pulmonary embolectomy

Diagnosis and Management of Common Surgical Conditions:

- Child with abdominal pain
- Vomiting child
- Trauma
- Groin conditions
- Hernia
- Hydrocoele
- Penile inflammatory conditions
- Undescended testis
- Acute scrotum
- Abdominal wall pathologies
- Urological conditions
- Constipation
- Head / neck swellings
- Intussusception
- Abscess
- In growing toenail
- Emergency Procedures
- Appendicectomy
- Incision and drainage of abscess*
- Pyloromyotomy
- Operation for testicular torsion*
- Insertion of pleural drain*
- Insertion of suprapubic catheter*
- Reduction of intussusception

Specialty Component for MS Orthopedics

Adult Orthopedics

TRAUMA

- GENERAL
 - Initial management of major multiple trauma system
 - Establishment of treatment priorities
 - Systemic effects of trauma
 - Patterns of injury
 - Shock bleeding
 - Management and Assessment of multiple extremity injuries

FRACTURES

- Definition
- Classification
- Biomechanics and mechanism of injury
- Management, reduction, maintenance and immobilization methods
- Simple fractures
- Complex fractures
- External fixation techniques

Healing

- Pathophysiological & radiological events
- Factors affecting fracture healing

- Union, Nonunion, delayed union

Skin

- Open fracture, Gustilo-Adreson classification
- Assessment and management of Types 1 and 2 open fractures
- Surgical management of Type III injuries.

Vascular

- Ischemic limb
- Impending and definite compartment syndrome, pathophysiology, assessment, initial management, indications for surgery
- Fasciotomy

Nerve Injury

- Awareness, assessment and investigative techniques

Muscle/Tendon Injury

- Introduction /assessment

Associated Injuries

- Introduction of common associated injuries and patterns

Early Fat Embolism Syndrome

- Clinical and radiological finding
- Differential diagnosis and management
- Traumatically induced coagulopathies

Deep Venous Thrombosis

- Pulmonary Embolism

Delayed Union and Nonunion

- Definition, clinical and radiological assessment, classification and management
- Principles for use of internal fixation
- Bone grafting, Types and techniques
- Recent Advances e.g electrical stimulation both internal and external

Malunion

- Definition
- Criteria of acceptable position
- Biomechanical and pathological effects of malposition
- Surgical revision of single planes of malunion
- Contractures around joints
- Surgical soft tissue releases

Pathologic Fractures

- Definition
- Etiology, natural history
- Clinical and radiological Assessment
- Adjunctive methods of management of open reduction, internal fixation
- Radical procedures for advanced disease

Soft Tissue Injuries

- Mild, moderately severe injuries
- Indications and timing of surgery
- Selection of incisions
- Handling of tissues
- Methods of wound closure, e.g simple, local flaps and Z-plasties

- Methods of soft tissue defects, use of local flaps and free flaps
- Infected wound
- Ischaemic wounds
- Myositis ossificans
- Wound healing by secondary intention
- Surgical excision Joint Injuries

Closed

- Classification of ligament injuries, clinical and radiological assessment, non- operative management, indications for surgery

- Principles of operative management.
- Surgical repair of simple (single) injuries.
- Surgical management of complex acute injuries and late reconstruction.
Open
- Assessment and management of simple lacerations into joints, use of suction
- irrigation techniques
- Major surgical joint debridement

Articular Cartilage

- Classification, assessment, natural history
- Use of continuous passive movement devices
- Arthrotomy for excision of loose bodies or replacement
- Internal fixation
- Surgical management of complex injuries

Upper Limb

Shoulder

- Clinical and radiological assessment
- Classification
- Complications and associated injuries
- Principles of operative management and indications for surgery
- Operative and non-operative management including techniques of open reduction

Proximal Humerus

- Clinical and radiological assessment
- Classification (Neer28)
- Complications and associated injuries
- Indications for surgery
- Indications for prosthetic replacement
- Open reduction/internal fixation
- Prosthetic replacement
- Non-operative management

Humeral Shaft

- Clinical and radiological assessment
- Classification
- Complications and associated injuries

- Indications for surgery
- Reduction, internal fixation
- Non-operative management
- Associated radial nerve injuries

Distal Humerus

- Clinical and radiological assessment
- Classification and mechanisms
- Complications and their management
- Indications for open reduction
- Open reduction/internal fixation of simple fractures (unicondylar)
- Open reduction/internal fixation of complex supracondylar and T-fractures
- Closed treatment

Elbow Dislocation

- Clinical and radiological findings
- Classification
- Closed reduction
- Complications and management
- Indications for surgery
- Open reduction

Olecranon

- Clinical and radiological findings
- Classification
- Indications for surgery
- Operative and Non-operative management

Radial Head and Neck

- Clinical and radiological findings
- Classification
- Complications and management of operative and non-operative management
- Indications for surgery
- Open reduction/internal fixation
- Radial head excision vs replacement

Combined Forearm and Elbow

- Clinical and radiological findings
- Classification – (Monteggia25)
- Surgical management.

Radius and Ulna-Shaft

- Clinical and radiological finding
- Classification
- Complications and management
- Indication and techniques of non-operative treatment
- Open reduction/internal fixation
- Operative management of complex cases
- Complications

- Clinical and radiological Findings
- Classifications
- Complications
- Operative and non-operative management

Distal Radioulnar Joint Isolated

- Clinical and radiological finding
- Complications
- Indications for surgery
- Operative and Non-operative management

Combined

- Clinical and radiological finding
- Classifications
- Complications
- Operative and Non-operative management

Carpal

- Clinical and radiological findings
- Classification
- Complications and their management
- Surgical Management

Hand Trauma

Spine And Pelvis

- Including blood supply to the spinal cord
- Pathology of spinal injury
- Complete neurological examination and its interpretation
- Neurological deficit
- Complications
- Associated injuries
- Radiological evaluation
- Team approach to spinal injuries Cervical Spine
- Clinical and radiological findings
- Classification
- Neurological evaluation
- Patterns of neurological deficits and injuries
- Methods of investigation
- Non-operative management – orthotics / braces
- Indications for surgery

- Knowledge of anterior approaches & instrumentation (not to include technical ability)
- Closed reduction of fractures and fracture dislocations
- Operative management of acute fractures and fracture dislocation to include decompression (posterior)
- Applications of halo and halo traction vest
- Stabilization of late instability

Thoracic and Lumbar

- Clinical and radiological findings
- Classification
- Neurological evaluation
- Patterns of neurological injury
- Indications for non-operative management, both skeletal and neurological
- Knowledge of types of surgical approaches and their indications
- Types of instrumentation for fixation and fusion
- Post-operative care
- Rehabilitation
- Functional assessment
- Non-operative management
- Operative treatment to include laminectomy posterior fusion, posterior instrumentation

Pelvis and Lower limb

- Pelvic anatomy – skeletal, visceral and neurological
- Classification of injuries
- Clinical assessment
- Complications
- Radiological study and interpretation
- Non-operative management and operative management
- Management of complications

Acetabulum

- Clinical and radiological findings
- Classification (Judet-Letournel²¹)
- Complications and associated injuries
- Operative and non-operative management
- Late reconstruction

Hip Dislocation

- Clinical and radiological findings
- Classifications
- Complications and associated injuries
- operative and non-operative management
- Open reduction of complex dislocations
- Late reconstruction

Femur Intracapsular

- Clinical and radiological findings

- Classification (Pauwels30, Garden16)
- Complications and associated injuries
- Operative and non-operative management
- Endo prosthetic replacement
- Late reconstruction

Extracapsular

- Clinical and radiological findings
- Classification (Evans12, Boyd & Griffin6, Tronzo43)
- Complications and their management
- Operative and non-operative management
- Late reconstruction and osteotomy

Subtrochanteric

- Clinical and radiological finding
- Classification (e.g. Fielding13)
- Complications and their management
- Operative and non-operative management
- Surgical management of complex fractures
- Indications for grafting, special devices

Femur Shaft

- Clinical and radiological finding
- Classifications
- Complications and associated injuries
- Indications for grafting
- Operative and non-operative management
- Post-operative management

Distal Femur

- Clinical and radiological finding
- Classifications (supracondylar, T-condylar and bi-condylar)
- Complications and their management
- Operative and non-operative management

Knee Ligaments & Dislocations

- Clinical and radiological finding
- Arthroscopy
- Classification
- Associated injuries and complications
- Operative and non-operative management
- Early and late ligament reconstruction
- Patella Fractures & Dislocations

Patella Fractures & Dislocations

- Clinical and radiological
- Operative management of acute injuries (ORIF, patellectomy retinacular repair)
- Patella stabilization
- Non-operative management
- Menisci
- Clinical and radiological assessment
- Associated injuries and complications
- Indications for surgery
- Operative management (including operative arthroscopy)
- Non-Operative management

Tibia Plateau

- Clinical and radiological findings
- Classifications
- Complications and associated injuries
- Operative and non-operative management
- Complex injuries, late reconstruction and reconstruction for complications

Tibial Shaft

- Clinical and radiological finding
- Classifications
- Complications and associated injuries
- Operative and non-operative management

Distal Tibia

- Clinical and radiological finding
- Classifications
- Complications and associated injuries
- Operative and non-operative management

Ankle Fractures

- Clinical and radiological finding
- Classifications
- Complications and associated injuries
- Operative and non-operative management

Ligament Injuries & Dislocations

- Clinical and radiological finding

- Classifications
- Complications and associated injuries
- Operative and non-operative management
- Reconstruction for late ligament instability

Foot – Tarsals (Fractures & Dislocations)

- Clinical and radiological findings
- Classification (e.g., Talus-Hawkins¹⁸)
- Complications and associated injuries
- Operative and non-operative management
- Late reconstruction for complications (non-union, malunion, delayed union and avascular necrosis)

Sub-Talar Dislocation

- Clinical and radiological findings
- Classifications
- Complications and associated injuries
- Operative and non-operative management

Calcaneus Fractures

- Clinical and radiological findings
- Classifications
- Complications and associated injuries
- Operative and non-operative management

Tarsal Fractures

- Clinical and radiological findings

- Classifications
- Complications and associated injuries
- Operative and non-operative management

Tarsal Metatarsal Dislocation

- Clinical and radiological findings
- Classifications
- Complications and associated injuries
- Operative and non-operative management

Metatarsal & Phalangeal Fracture

- Clinical and radiological findings
- Classifications
- Complications and associated injuries
- Operative and non-operative management

HAND

Hand surgery training in orthopedic is important in two aspects:

1. The preparation of candidates for examination.
2. The management of common “minor” hand surgical problems.

Trauma

- Clinical and radiological findings

- Classification of bony lesions and soft tissue injuries
- Complications and their management
- Post-operative care and rehabilitation
- Operative and Non-operative management (including the causes of deformity and methods of splintage)

Dislocations & Ligament Injuries

- Clinical and radiological findings
- Classification
- Complications
- Methods of splintage
- Rehabilitation and post-operative care
- Operative and non-operative management of acute injuries

Open Injuries

- Clinical and radiological findings
- Assessment of tissue viability
- Principles of methods of closure
- Rehabilitation
- Operative management of appropriate soft tissue injuries
- Amputation levels and technique
- Technical competence in simple closure, delayed closure, local flaps, Z-plasties
- Assessment of priorities for repair of associated injuries (nerve, vascular, tendon, bone)

Tendon

- Clinical and radiological findings of tendon injury
- Function
- Deformity
- late reconstruction
- non operative and operative management of acute injuries
- Methods of arthrodesis
- Repairs of extensor and flexor tendons

Massive Combined Injuries

- Clinical and radiological findings
- Assessment of tissue viability and function
- Establishment of treatment priorities
- Principles of advanced reconstruction and rehabilitation
- Debridement and amputation levels

Rheumatoid Arthritis & Osteoarthritis

- Clinical and radiological findings
- Assessment of functional deficit
- Principles of hand rehabilitation
- Non-operative and Operative management of common soft tissue and bony procedures for the arthritic patient (e.g. synovectomy, splintage, etc)

Congenital Anomalies

- Clinical and radiological findings
- Classifications
- Non operative and Operative management of anomalies

Paralytic

- Clinical and radiological findings
- Assessment of functional deficit
- Techniques of splintage
- Principles and techniques of tendon transfer
- Surgical reconstruction of common problems (e.g., radial nerve palsy)

Infections

- Clinical and radiological findings
- Management of paronychia, pulp space infection, septic tenosynovitis
- Non-operative and Operative management of infection of fascial spaces (mid-palmar, thenar, hypothenar, subaponeurotic)

Tumors

- Clinical and radiological findings
- Staging of neoplasms
- Functional deficit
- Operative and non-operative management

NEUROMUSCULAR

Brain

- o Anatomy, physiology and pathology of those traumatic, vascular and degenerative conditions causing, presenting as, or altering musculoskeletal function including control of sensory motor function (head injuries, cerebral palsy,

stroke, co-ordination (Fiedreich's ataxia²²) psychomotor disturbances and psychic regional pain

- o Clinical examination of neuromuscular diseases
- o Non-operative and operative management

Spinal Cord

- o Congenital, traumatic, vascular, neoplastic and degenerative conditions
- o Presentation, clinical findings and methods of investigation

- o Operative and non-operative management

Peripheral Nervous System

- o Degenerative, traumatic, congenital disorders and neoplasms
- o Presentations, clinical findings
- o Classification of nerve injuries
- o electrophysiological testing
- o Non operative and Operative management
- o Entrapment syndromes eg carpal tunnel
- o Retraining and rehabilitation

Muscle

- o Inflammatory, dystrophic, degenerative and neoplastic conditions
- o Presentation and clinical findings
- o Clinical examination, strength grading, long tendon imbalance, secondary deformities, tenodesis and contractures
- o Non operative and Operative management

JOINTS

- o Synovium, its inflammatory and proliferative conditions and its response to injuries.
- o History, clinical examination

Investigative Techniques

- o Arthrography, joint aspiration, arthroscopy, radionuclide scans
- o Synovial fluid analysis

Pharmacology

- o Non-steroidal anti-inflammatory medications, steroids, anti-metabolites, radioisotopes

Role of Surgery

- o Operative and non-operative management

Infection

- o Presentation and clinical examination
- o Antibiotic management
- o Investigation, diagnosis and surgery
- o Principles of arthrodesis
- o infected arthroplasty and revision surgery for arthroplasty
- o Major joint debridement's
- o Arthrodesis of major joints
- o Arthrotomy, arthrocentesis, arthroscopic lavage, establishment of suction irrigation

Inflammation (Rheumatoid and Sero-negative)

- o Pathophysiology
- o classification
- o Non-surgical and surgical management

Upper Extremities Hand & Wrist

- o Pathomechanics of joint deformity
- o Non-operative management (Orthotics, therapy)
- o Radiological evaluation
- o Arthrodesis
- o Arthroplasties
- o Excision of distal ulna

Elbow

- o Pathomechanics, clinical and radiological evaluation of deformity
- o Indications for surgery (including debridement, synovectomy, and arthroplasty)
- o Surgical management including joint debridement, synovectomy, radial head excision
- o Arthroplasty
- o Non-operative management
- o Excision rheumatoid nodules
- o Ulnar nerve transposition

Shoulder

- o Indications for arthrodesis and arthroplasty
- o Synovectomy and stabilization

- o Arthroscopy
- o Non-operative management Excision distal clavicle

Spine

- o Cervical instability, classification
- o surgical stabilization, including adjunctive methods, methyl methacrylate, internal fixation devices
- o Halo application and management of halo-vest

Lower Limb Foot / Ankle

- Total ankle arthroplasty
- o Diagnostic arthroscopy
- o Synovectomy and arthrodesis
- o Non-operative management (orthotics)

Knee

- o total joint replacement and arthrodesis
- o Synovectomy
- o Non-operative treatment (Radio-isotopic synovectomy)

Hip

- o Total hip arthroplasty and revision surgery
- o Technique of revision THR without severe bone loss
- o Non-operative management.

Degenerative (Osteoarthritis)

Upper Limb Hand / Wrist

- o Classification of carpal instabilities
- o Arthroplasty (excisional, interpositional)
- o Detailed clinical and radiological assessment of wrist mechanics
- o Arthrodesis (intercarpal and radiocarpal)

Elbow

- o Arthroplasty
- o Contractures and their management
- o Joint debridement, excision loose body
- o Arthrodesis

Arthroscopy

- o Non-operative management
- o Excision of radial head

Shoulder

- o Rotator cuff decompression (acromioplasty), repair
- o Arthroplasty
- o Arthrodesis
- o Arthroscopy
- o Operative and Non-operative management (therapy-injection)

Lower Limb

Knee

- o Assessment of ligamentous instability
- o Assessment of biomechanical predisposing factors (clinical, arthroscopic, radiological)
- o Principles of distal femoral osteotomy
- o Arthroscopy
- o Arthroscopic excision of loose bodies, debridement
- o High tibial osteotomy
- o Arthrodesis
- o Total joint arthroplasty
- o Operative and Non-operative management
- o Patellectomy

Hip

- o Biomechanics of proximal femoral and pelvic osteotomy
- o Assessment of the painful implant
- o Total hip Arthroplasty – cemented and non-cemented
- o Revision arthroplasty in the absence of severe bone loss
- o Non-operative and operative management.

Reactive and Metaplastic Disorders:

- o (Villonodular Synovitis) (Synovial Chondromatosis)
- o Investigative techniques (arthrography, diagnostic arthroscopy, synovial biopsy)
- o Excision of pedunculated lesions

- o Joint debridement, synovectomy, removal of loose bodies

Tumours

(Synovioma and Synovial Sarcoma)

ONCOLOGY

Tumors and Reactive Lesions Primary

- o Definitions (neoplasia, carcinoma, sarcoma, cyst, reactive lesion, hyperplasia, dysplasia)
- o Aetiology, Pathogenesis, control of growth, methods of spread of neoplasms in general (local-systemic-privilege of joint) and of sarcomas in particular
- o Clinical presentation of bone pain, systemic manifestations, limb locations, spine locations
- o Epidemiology (geographical, social, risk factors)
- o investigation (lab-discriminating tests)
- o Radiological investigations,
- o Classification by cell or origin of primary tumours and reactive lesions of bone and primary soft tissue tumours
- o Biopsy
- o Adjunctive methods of treatment
- o Techniques
- o and their indications, timing and complications

- o Clinical pathological and radiological picture of tumours and reactive lesions of bone and soft tissue tumours including incidence, epidemiology natural history and prognosis

- o staging

- o Limb sparing surgery, allograft considerations, implant considerations, regional

adjuvant techniques

Metastatic Tumours to Bone

- o Most common primary tumors metastasizing to bone

- o Work-up for a tumour of unknown origin

- o Radiological picture of metastatic bone disease and its differential diagnosis

- o The investigation of a lytic lesion in bone

- o Management of complications of metastatic bone disease (hypercalcaemia)

- o Knowledge of methods of spine decompression and stabilization

- o Operative and Non-operative management of pathological fracture

INFECTIOUS DISORDERS

Definitions and Terms

- o Pus

- o Sequestrum

- o Involucrum

Aetiology and Classification

- o Bacterial (acute, chronic), Tuberculosis

- o Pathogenesis

- o Hematogenous, inoculation (compound wound), direct spread, septic arthritis, osteomyelitis (vertebral, girdle and extremities) and periprosthetic (acute and chronic)
- o Clinical Picture
- o Acute – subacute – chronic
- o Differential diagnosis
- o Discriminate between bone and joint clinical signs

Investigations

Laboratory and Bacteriology

- o Hematology (CBC, ESR)
- o Bacteriology, technique of staining and staining characteristics
- o Methods of culture, pathology, gross and microscopic treatment of specimens's
- o Detailed knowledge of the organisms found to produce musculoskeletal infections, their incidence, frequency, methods of spread, methods of culture microscopic characteristics, predilection for specific sites, tissue and conditions, pathogenesis of infection, mechanisms of spread

Imaging

- o Radiology – early and late changes
- o Radioisotope – Tc/gallium/indium
- o CT and MRI
- o Antibiotic selection principle
- o Indications for surgery Pharmacology of Antimicrobial Agents
- o Mechanisms of action, spectrum, dose and administration, metabolism, specific variations and their use to specific conditions (renal failure), complications

- o Prognosis and Complications
- o Nosocomial infections
- o Hospital bacteriological environment
- o Altered host resistance
- o Development of organism resistance, precautions

Osteomyelitis

- o Clinical and radiological findings
- o Classification
- o Complications
- o Operative and Non-operative management
- o Adjunctive methods – management – (Intracavitary antibiotics)
- o Major bone resections and reconstruction

Septic Arthritis

- o Clinical and radiological findings
- o Classification
- o Complications
- o Operative and Non-operative management
- o Late reconstruction for complications, instability – major joint destruction
- o Arthrocentesis, arthroscopy

Specific

- o Compound Fractures
- o Clinical and radiological findings
- o classification of soft tissue wound, associated injuries, bony injuries
- o Initial non-operative management (culture, wound care, tetanus prophylaxis, antibiotics)

- o Operative management – Type I and II
- o Operative management of Type III (soft tissue wound, neurovascular injury, fracture)
- o Methods of fixation
- o Technique of open cancellous grafting
- o Surgical management of established infections and other complications (delay union, non-union)
- o Soft tissue coverage, local flaps & myocutaneous resection and reconstruction
- o Amputation

Immune Compromised Conditions

- o Clinical and radiological findings
- o Differential diagnosis
- o Investigative techniques
- o Methods of wound culture
- o Antibiotic therapy
- o Operative management

Tuberculosis

- o Clinical and radiological findings
- o Differential diagnosis
- o Technique of aspiration biopsy of peripheral lesions
- o Antibiotic therapy
- o Atypical infections
- o Aspiration spinal biopsy, open biopsy and debridement
- o Resection
- o Amputation

- o Arthrodesis

SPINE

- o Embryology
- o Gross anatomy of the spinal column, spinal cord, their blood supply, both intrinsic and extrinsic
- o Functional and microscopic anatomy of the spinal cord
- Biomechanics of the spine and its abnormalities
- o Non-operative management, various types of braces and their efficacy
- o Role of physiotherapy

Cervical Spine

- o biomechanics of the motion segment (normal and pathological)
- o Clinical and radiological Findings
- o Classification
- o Detailed neurological examination
- o Non-operative management and operative management
- o Operative management
- o pathogenesis, results, complications of management
- o Laminotomy and disc excision
- o Anterior approaches cervical discectomy and fusion (not necessarily in antero- lateral approaches – or odontoid)

Degeneration and Instability of the Cervical Spine

- o Clinical and radiological findings
- o Classification
- o Operative and Non-operative management
- o Detailed knowledge of pathogenesis and limitations of methods of investigation
- o Anterior fusion techniques (ACDF)
- o Results and complications

Thoracic Discs

- o Clinical and radiological findings
- o Differential diagnosis
- o Classification
- o Neurological examination
- o Operative and Non-operative management
- o Investigation methods (myelography, electrophysiology, tomography and discography)
- o Management of complications
- o Minimally invasive techniques
- o Foraminotomy
- o Laminectomy
- o Disc excision

Mechanical Instability (Spondylolytic or Degenerative)

- o Clinical and radiological findings
- o Classification

- o Complications and associated conditions
- o Pathophysiology
- o Operative and Non-operative management (spinal orthoses, physiotherapy)

Methods of investigation

- o Results and complications

Degeneration etc. (Spinal Stenosis, Central and Lateral)

- o Clinical and radiological findings
- o Classification
- o Associated conditions
- o Operative and Non-operative management
- o Pathogenesis
- o Methods of investigation (myelography, electrophysiology, discography)
- o Results and complications)

Infection

- o Diagnosis
- o Classification
- o Investigation
- o Basic treatment
- o Knowledge of operative approaches (but not technical competence in surgical treatment)

Tumours

- o Radiological findings of disease

- o Knowledge of operative approaches
- o Knowledge of methods of surgical treatment (but not technical competence of surgical treatment)

Deformity

- o Clinical and radiological findings
- o Pathogenesis
- o Natural history
- o Neurological examination
- o Operative and Non-operative management

FOOT AND ANKLE

Biomechanics

- o biomechanical analysis of the normal foot and its function.
- o Predisposing biomechanical factors to symptomatology

Clinical Evaluation

- o Thorough clinical examination

Investigative Technique

- o Clinical and radiological findings

Ankle

Trauma

See Trauma – Fractures and Dislocations

Osteochondritis Dissecans

- o Clinical and radiological findings
- o Differential diagnosis
- o Classification
- o Aetiology
- o Non-operative and operative management
- o Arthroscopy

Subtalar Complex

Hypermobility Pes Planus

- o Clinical and radiological findings
- o Non-operative and operative treatment

Spastic Flat Foot

- o Clinical and radiological findings
- o Classification
- o Non-operative and operative management

Lateral Process Fracture

- o Clinical and radiological findings
- o Non-operative and operative management

Tarsal and Tarsometatarsal

Pes Cavus

- o Clinical and radiological findings
- o Aetiology
- o Associated conditions
- o Non-operative and operative management

Degenerative

- o Clinical and radiological assessment
- o Non-operative and operative management

Metatarsophalangeal

- o Clinical and radiological findings
- o Classification
- o Biomechanical causes
- o Non-operative and operative management
- o Technical competence in realignment procedure, exostectomy and pseudarthrosis (excision arthroplasty)
- o Osteotomy and implant arthroplasty

Sesamoids

- o Clinical and radiological findings
- o Non-operative and operative management

Neuroma

- o Assessment and Non operative and operative management
- o Competence in decompression and neurectomy

Toes

- o Clinical and radiological findings
- o Biomechanical forces contributing to deformity
- o Non-operative and operative treatment
- o Competence in interphalangeal fusion
- o Tendon transfers
- o Tenotomy

Specific Conditions

Neuropathic (Diabetic Charcot)

- o Clinical and radiological findings
- o Neurological and vascular evaluation
- o General methods of foot care and precautions
- o Causes of ulceration and deformity
- o Non-operative and operative management (healing cast technique, orthotics, General foot care of skin lesions)
- o Indications for antibiotics
- o Special investigative methods (bone scan, tomography)
- o Competence in debridement of calluses and minor ulcerations
- o Debridement and amputations
- o Arthrodesis
- o Exostectomies
- o Management of complex combined neuropathic changes

Ankle

- o Clinical and radiological assessment
- o Biomechanical analysis of the causes of deformity
- o Specific orthotic management
- o Competence in the operative management

AMPUTATIONS, PROSTHETICS AND ORTHOTICS

Amputations

Conditions

- o congenital conditions requiring amputation are, ischemia, due to disease and vascular injuries, tumor, infection, trauma and the specific indications required for each.

Limb Assessment

- o Knowledge and clinical competence in the assessment of the limb with reference to viability of the stump and successful eradication of disease.

Patient Assessment (Psychological Status) – Social, Psychological and Economics Impact

- o Ability to co-operate with occupational therapist, physiotherapist and rehabilitation team. Ability to use a prosthetic appliance functionally (intelligence, cardiopulmonary status, motivation).

Team Approach – Contributions and Roles played by the Prosthetist, Physiotherapist, Occupational Therapist, Psychologist and Social Worker.

Surgical Principles

- Levels of amputation, optimal stump length, technical considerations for standard amputations, recognition and management of complications, post-operative care (types of dressings, i.e. immediate vs early fitting), management of stump oedema, haematoma, infection, necrosis, contractures, neuromas and phantom pain

Prosthetics

Material

- o Knowledge of the materials used in the formation of the various components of the prosthesis, their benefits, shortcomings and alternative materials available.

Functional Assessment

- o Knowledge and functional assessment of the demands placed on the prosthesis related to patient age, size, sex, vocation and the ability to alter various prosthetic components for best function.

Socket

- o Knowledge of the methods of socket fitting, difficulties with variation in stump size and length, special conditions and the assessment of stump symptoms with their reference to socket fitting.

Suspension

- o Knowledge of the standard methods of prosthetic suspension, various alternatives available and the ability to choose from these for the most functional prosthetic fitting.

Joint

- o Knowledge of the standard types of joints used in prosthetic fittings, their benefits, shortcomings, alternative joints available and the ability to choose from these alternatives.

Cosmetics

- o Knowledge of the methods of cosmetic covering of prostheses.

Fitting

- o Knowledge of the methods of prosthetic fitting, balancing, alignment and ability to relieve stump socket symptoms due to these causes.
- o Knowledge of the above general components to allow correct prosthetic prescription for each of the standard lower extremity amputation levels.
- o Knowledge of the major contact and pressure areas in the lower extremity stump for each phase of gait.

Upper Extremity

- o Knowledge of the above general components to allow correct prosthetic prescription for best function prosthesis.
- o Knowledge and clinical ability to assess the causes of limited function relative to prosthetic fitting or components.

Orthotics

Orthotic Principles

- o Knowledge of the aims of orthotic fitting – stability, control of motion, prevention of deformity, maintenance of alignment and the basic methods by which these are achieved.

Materials

- o Knowledge of the materials commonly used in orthoses, their benefits, drawbacks and alternative materials available.

Assessment

- o Knowledge and clinical ability to assess the biomechanical problem at hand, the function deficiency and apply basic orthotic principles for their correction.

Fitting

- o Knowledge of the techniques of orthotic fitting.

Prescription

- o Knowledge of the above general components to allow correct orthotic fitting and the assessment of function of the orthoses.

Regional

Lower Extremity

- o Post-operative management including immediate prosthetic fitting
- o Detailed knowledge of prosthetic prescribing and supervision of rehabilitation
- o Assessment of complications of amputation surgery for toes, trans metatarsal, below knee, above knee amputations, (chronic stump pain, stump ulceration, neuroma, stump overgrowth, hypertrophic new bone, ankle disarticulation (Syme40 & Boyd5), knee disarticulation and hip disarticulation)
- o Management of complications
- o Hip disarticulation
- o Hemipelvectomy
- o Amputations of toes, trans metatarsal, below knee, above knee (including assessment of neurovascular status, potential viability of the stump, selection of types, location of flaps)
- o Musculotendinous reinsertion, (“myoplasty, myodesis”) Upper Extremity
- o Occupational and physiotherapy
- o {Prescription of prosthetic appliances
- o Post-operative management of the stump

- o Prescription fitting
- o Shoulder disarticulation and fore-quarter amputation
- o Amputations of the finger or ray amputation
- o Amputations through the wrist, forearm, elbow disarticulation, upper arm (including care of the stump)

SPORTS MEDICINE

Osteopenia (secondary to amenorrhea).

Pathophysiology

Inflammatory process (with special reference to repetitive injuries and stresses).

Biomechanics

- o Involving specified function, i.e. walking, running, throwing, swimming.

Development and use of protective equipment and safe surroundings.

Pharmacotherapeutics

- o Use and abuse of drugs in relation to sports (injury management, performance enhancing).

Team Approach

- o Awareness that the contemporary setting involves a sophisticated team of experts including physicians, physical educationalists, physiotherapists, nutritionists, physiologists, engineers, nutritionists.

Upper Limb

Shoulder – Impingement Syndromes (Rotator Cuff)

- o Clinical and radiological finding

- o Classification
- o Complications and associated conditions

- o Non-operative management (physiotherapy, injection techniques)

- o Investigative techniques (injection, arthrography, arthroscopy)
- o Surgical decompression of impingement
- o Operative repair of tears, acute and chronic

Biceps Tendon

- o Clinical and radiological finding
- o Operative & Non-operative management

Elbow – Epicondylitis

- o Clinical and radiological finding
- o Differential diagnosis
- o Investigative techniques
- o Surgical & conservative management

Instability Medial (Throwing)

- o Clinical and radiological finding
- o Differential diagnosis
- o Biomechanical analysis
- o Non operative & Operative management

Lower Limb

Foot

- o Clinical and radiological finding
- o Differential diagnosis
- o Primary non-operative treatment
- o Biomechanics of running, normal and pathological (planovalgus, pes cavus concerning pre-disposition)
- o Non-operative & operative management

Ankle

Achilles Tendon

- o Clinical Examination & radiological findings
- o Differential diagnosis
- o Non-operative & operative management
- o Surgical reconstruction for late rupture

Lower Leg

- o Clinical and radiological findings
- o Differential diagnosis
- o investigation
- o Non-operative management & Operative management

Patella

- o Clinical and radiological findings (mal-alignment, instability, abnormal tracking)
- o Others overuse syndrome (patellar tendinitis, iliotibial band friction syndrome)
- o Biomechanical principles, predisposition
- o investigation (including diagnostic arthroscopy)

Hip

- o Stress Fractures
- o Clinical and radiological findings
- o Differential diagnosis of groin pain (with special reference to overuse syndromes)
- o Associated conditions
- o Investigative techniques (bone scan, arthrography, arthroscopy)
- o Non-operative and operative management (medication, physiotherapy, orthotics)

Muscle Tendon

(adductor Tendinitis, Pubic Symphysitis, Hip Pointer)

- o Clinical and radiological evaluation
 - o Differential diagnosis
 - o Associated conditions
 - o Non-operative and operative management
-
- o Spine (See under Spine)
 - o knowledge of biomechanics of the spine and brachial plexus (with special reference to sports injuries)
 - o Predisposing condition (congenital anomalies)
 - o Special precautions
 - o Non-operative and operative management (training techniques, orthotics, physiotherapy)

PAIN

- o Definition of chronic pain syndromes.
- o Theories of the mechanisms
- o Role of endogenous opiates (endorphins).
- o Psychological factors.
- o Clinical picture
- o Investigation
- o Principles of management.

PAEDIATRIC ORTHOPAEDICS

GENERAL AFFECTIONS OF BONE

Define

- o Dysplasia
- o Dystrophy

Dysostosis

- o Classify the epiphyseal, physeal, metaphyseal, and diaphyseal dysplasias,
- o Identify each of the following conditions, pointing out the distinguishing clinical, radiological and laboratory features giving the prognosis.
 - Acrocephalosyndactyly
 - Multiple epiphyseal dysplasia
 - Achondroplasia
 - Melorrrheostosis
 - Metaphyseal dysostosis
 - Metaphyseal dysplasia
 - Osteopetrosis

- Osteogenesis imperfecta
- Englemann's disease
- Osteopoikilosis
- Diastrophic dwarfism
- The mucopolysaccharidoses
- Spondyloepiphyseal dysplasia
- Enchondromatosis
- Hypophosphatasia
- Dysplasia eiphysealis hemimelica

Metabolic and Endocrine Disorders

- o Slipped Capital Femoral Epiphysis
- o List of predilected age group, sex, body types, and the incidence of bilaterality in slipped capital femoral epiphysis.
- o Describe the theories of aetiology.
- o List the expected clinical and roentgenographical features
- o Describe the optimal operative treatment for each of the above slipped capital femoral epiphyses.
- o Discuss the complications of slipped capital femoral epiphysis and its treatment.
- o Plan a corrective osteotomy of the proximal femur.
- o Demonstrate the ability to manage an acute slipped capital femoral epiphysis by traction and pinning in situ.

Rickets

- o List the types of rickets and the specific aetiology of each.

- o Describe the characteristic clinical, radiological, laboratory, and pathological findings in each type of rickets.
- o Discuss the management of a given patient with rickets.

Renal Osteodystrophy

- o Describe the initial pathologic lesion in renal osteodystrophy.
- o List the characteristic clinical, radiological and laboratory features of renal osteodystrophy.
- o Discuss the management of a given patient with renal osteodystrophy.

Hypophosphatasia

- o Discuss the metabolic defect, genetics, clinical, radiological and laboratory characteristics of hypophosphatasia.

Hypoparathyroidism

- o Describe the clinical and laboratory findings in idiopathic hypoparathyroidism.

- o Give the primary feature that distinguishes hypoparathyroidism.

Hypothyroidism

- o Discuss the aetiology and the clinical, radiological and laboratory findings in

Cretinism

- o Discuss the management and prognosis of a given patient with Cretinism.

Circulatory Disorders

Osteonecrosis

- o Define osteonecrosis as to pathogenesis.
- o Given a specific history, physical examination, and x-rays, identify, outline a rational plan of management, and give the prognosis for:
 - Osgood-Schlatter's Disease
 - Köhler's Disease
 - Sever's Disease
 - Freiberg's Infraction
 - Scheuermann's Disease
 - Calve's disease (not an osteonecrosis)
 - Panner's Disease
 - Blount's Disease
 - Legg-Calve-Perthes Disease
 - Osteochondritis dissecans
- o List the causes of aseptic necrosis of the capital femoral epiphysis in children.
- o Describe the types of Legg-Calve Perthes disease including at least two characteristics of each type of their prognostic significance.
- o Describe the pathological stages of coxa plana and correlate each stage with its radiological appearance.
- o Discuss the operative and non-operative management of Legg-Calve Perthes
- o Describe the various orthoses available and prescribe and check out an orthosis for use in the ambulatory treatment of unilateral coxa plana.
- o Perform an arthroscopy or arthrotomy of the knee and remove a loose body.

Sickle Cell Disease

- o Classify a given primary tumor (benign or malignant) according to the AFIP

Fascicle in the following series:

- Osteogenic
- Chondrogenic
- Collagenic
- Myelogenic
- o Recognize a given bone or soft somatic tissue tumor by clinical, radiological, and pathological examination.
- o Stage a tumor.
- o Outline the management and prognosis of the above tumor, and give the rationale for the plan chosen including indications for limb salvage or amputation.
- o Demonstrate knowledge of principles of radiotherapy and chemotherapy for malignant tumours.
- o Describe the clinical, radiological and pathological features, prognosis and management of :
 - Eosinophilic granuloma
 - Hand-Schuller-Christian disease
 - Letterer-Siwe disease
 - Gaucher's disease
 - Chondroblastoma
 - Fibrous dysplasia
 - Unicameral bone cyst
 - Aneurysmal bone cyst
 - Fibrous cortical defect
 - Non-ossifying fibroma
 - Chondromyxoid fibroma

- Enchondroma
- o Discuss the biopsy techniques and pre-requisites for a satisfactory biopsy.
- o Discuss the common metastatic bone tumours in children.
- o Excise a benign tumour
- o Inject a bone cyst

1.a.I.II.2 INFECTIONS OF BONES AND JOINTS

- o Discuss the pathogenesis of haematogenous osteomyelitis.
- o List the characteristic clinical, radiological, radio-isotopic, laboratory and pathological features in acute, subacute, chronic and residual osteomyelitis.
- o Prescribe an appropriate course of antibiotic therapy for a given patient with acute osteomyelitis.
- o List the indications for operative treatment of acute and chronic osteomyelitis.
- o Discuss the management of a given patient with one of the following complications of osteomyelitis:
 - o fracture
 - o pyarthrosis
 - o growth disturbance
- o Treat a case of acute osteomyelitis.
- o Understand the principles and techniques of treatment of chronic osteomyelitis i

INFECTIONS OF JOINTS

Arthritis

Pyogenic

- o Describe the pathogenesis and pathological changes occurring in the joints of infants and children with acute pyogenic arthritis

Describe the bacteriological, clinical, laboratory, and radiological characteristics of acute septic arthritis.

- o Describe the management and list possible complications of acute pyogenic arthritis
- o List factors that may affect the prognosis of acute septic arthritis in children.
- o List the conditions to be considered in the differential diagnosis of a child with an acutely painful joint and the plan by which you would reach a specific diagnosis.
- o Discuss the clinical, radiological, laboratory, and bacteriological characteristics of inflammatory conditions of the intervertebral disc.
- o Discuss the management and prognosis of a given paediatric patient with an inflammatory condition of the intervertebral disc.
- o Discuss foreign bodies and nail puncture wounds in the aetiology of septic arthritis.
- o Aspirate the hip joint.
- o Incise and drain the affected hip joint of a patient with pyogenic arthritis.

Rheumatoid

- o List the clinical, laboratory, radiological and prognostic differences between rheumatoid arthritis in adults and children.
- o Outline an approach to the management of a given child with monoarticular rheumatoid arthritis, including the indications for:

- o specific drug therapy
- Splints, casts, and traction
- Physical therapy
- Surgery
- Ophthalmology consultation
- o Make and apply appropriate splints to immobilize specified joints in a patient with arthritis.
- o Aspirate any joint illustrating anatomical landmarks.

Haemophilia

- o List the congenital disorders of coagulation that may be associated with recurrent haemarthrosis and indicate the distinguishing genetic, laboratory and clinical characteristics of each.
- o Discuss the management of a given child with an acute hemophilic haemarthrosis, including:
 - o type, amount and duration of replacement therapy
 - o use of traction, splints and casts
 - o indications for aspiration
- o Discuss the management of a given child with chronic hemophilic arthropathy, including the indications for:
 - o home maintenance therapy
 - o use of traction, splints, and casts
 - o operative treatment
- o Discuss the specific indications and contraindications for, expected results from, and coagulation management of:
 - o synovectomy of the knee joint
 - o replacement of the knee joint

- o excision of pseudotumor
- o Discuss the previous high incidence of H.I.V. infection in hemophilic patients and the precautions to be taken during invasive procedures.
- o Demonstrate various traction and casting techniques to correct a knee flexion contracture in a patient with haemophilia.
- o Knowledge of orthotics and techniques to arrest a flexion contracture of the knee or elbow.
- o Set up continuous passive motion equipment for post -hemarthrosis of knee.

Tuberculosis

List the distinctive clinical, laboratory (including bacteriology and analysis of the synovial fluid), radiological, and pathological features of tuberculous arthritis in peripheral joints.

- o Discuss the pathogenesis, clinical, radiological, and pathological findings in spinal tuberculosis (Pott's disease) with and without Pott's paraplegia.
- o Describe the management of a child with tuberculous arthritis of the hip or spine, including:
 - o Type and duration of drug therapy
 - o Indications for casting
 - o Types of operative treatment, with indications for each
 - o Perform a needle biopsy of a vertebral lesion.

Discoid Meniscus

- o Discuss the embryology of the knee joint.
- o Describe the altered anatomy in the knee and mechanism by which it produces a "discoid" lateral meniscus

- o List the clinical and pathological findings encountered in a “discoid” lateral meniscus.
- o Discuss the operative treatment of a “discoid” lateral meniscus with emphasis on technical differences between excision of a “non-discoid” and “discoid” menisci, including arthroscopic differences.
- o Perform a diagnostic arthroscopy of the knee in a teenage patient.

Popliteal Cyst

- o Discuss the aetiology and natural history of popliteal cysts in children (as opposed to adults).
- o Describe the possible anatomical relationships between popliteal cysts and the adjacent bursae, muscles and joint.
- o Discuss the indications for non-operative and operative treatment of a popliteal cyst.
- o Give a differential diagnosis of swelling behind the knee and how to differentiate.
- o Aspirate and inject a popliteal cyst. Transient Synovitis of the Hip
- o Discuss possible aetiologies of transient synovitis of the hip.
- o Describe the clinical, laboratory and radiological findings and differential diagnosis of transient synovitis of the hip.
- o Discuss the treatment of transient synovitis of the hip.

1.a.I.II.4 AFFECTIONS OF THE NERVOUS SYSTEM

Cerebral Palsy

- o Classify cerebral palsy according to the aetiology and site of neuropathological changes and discuss the clinical findings in each.

- o Given a patient with cerebral palsy, discuss the principles upon which the total care of the patient will be based.
- o Discuss appropriate non-operative and/or operative management of a given patient with cerebral palsy.
- o List the indications, advantages, disadvantages, post-operative management, and unique complications of each of the following types of surgery in cerebral palsy:
 - Neurectomy
 - Tendon or muscle lengthening
 - Tendon transfer
 - Arthrodesis
- o List the commonly encountered hand, wrist, elbow, spine, hip, knee, ankle and foot deformities in cerebral palsy and discuss the management of each – alone or in combination.
- o Discuss the pathogenesis and management of the subluxed hip in the cerebral palsy child.
- o Understand the progression and management principles of scoliosis in the cerebral palsy patient.
- o Discuss the principles of seating the non-ambulatory cerebral palsy child.
- o Discuss the pathogenesis and treatment of pelvic obliquity.
- o Perform a tendon transfer or lengthening for correction of a spastic deformity.
- o Perform a subtalar arthrodesis.
- o Perform a femoral osteotomy.

Spinal Dysraphism

- o Describe the incidence and natural history of myelomeningocele, according to Sharrard 15 and to Smith.
- o Describe the genetics and list theories of aetiology of spinal dysraphism indicating the strengths and weaknesses of each.
- o Describe the pathological features of spinal dysraphism.
- o Describe the most likely deformity of the hip, knee, ankle, foot and toes resulting from neurosegmental lesions at levels L1, L2, L3, L4, L5, S1, S2, S3 and indicate the reasons for each deformity.
- o List the spinal levels of involvements by myelomeningocele in order of frequency according to Sharrard.
- o Describe, for each of the following deformities, the pathogenesis, segmental level, indications, and contraindications to non-operative and operative management and methods to retain management gains:
 - Equinovarus foot
 - Equinovalgus foot
 - Planovalgus foot
 - Hyperextension deformity of the knee
 - Paralytic dislocation of the hip
 - Knee flexion deformity
 - Pelvic obliquity
 - Lumbar lordosis
 - Paralytic scoliosis
 - Calcaneus foot
- o Discuss the incidence, prevention and treatment of each of the following complications of myelomeningocele:
 - Trophic ulceration

- Neuropathological arthropathy
- Non-union of attempted arthrodesis
- Fractures and epiphyseal separations
- Pelvic obliquity
- o Understand the ambulatory and mobility devices available for the myelomeningocele child.
- o Apply a cast to the limb of a given patient with sensory deprivation of the limb.
- o Prescribe and check an orthoses for deformity in the paraparetic child

Diastematomyelia

- o List the pathological, clinical and radiological findings in diastematomyelia.
- o Discuss the management of a given patient with a slowly progressive neurological deficit in one lower limb caused by diastematomyelia.
- o Discuss tight filum terminale with regards to investigation, differential diagnosis and management.

Friedreich's Ataxia

- Give the pathogenesis and mode of inheritance and describe the pathological changes in the spinal cord and cerebellum in Friedreich's ataxia,
- o Describe the clinical findings in classical Friedreich's ataxia.
- o Discuss the management of the orthopaedic problem in a give patient with Friedreich's ataxia.

Peripheral Nerve Disorders

- o List the types of inheritance of Charcot-Marie-Tooth disease.

- o Discuss the clinical, electromyographic, and pathological findings in Charcot- Marie-Tooth disease.
 - o Discuss the prognosis and management of a given patient with Charcot-Marie-Tooth disease.
- Poliomyelitis

- o List the clinical and laboratory features of poliomyelitis that are important in its differential diagnosis.
- o Describe the clinical stages of poliomyelitis.
- o Describe the pathological findings in poliomyelitis.
- o Discuss the non-operative management of a given patient with:
 - o Acute, and
 - o Convalescent
- o Poliomyelitis, including indications for the use of bed rest, splints, braces, muscle strengthening exercises, and timing of ambulation.
- o List the indications for operative treatment in a patient with residual poliomyelitis.
- o Describe a rational plan of reconstructive surgery in a given patient with residual poliomyelitis affecting either the limbs or the spine or both.

Neurofibromatosis

- Describe the clinical manifestations and pathological findings encountered in neurofibromatosis involving the following tissues:
 - Cutaneous
 - Subcutaneous
 - Nervous

- Skeletal
- Vascular
- Lymphatic
- Discuss the possible relationships with neurofibromatosis in patients who have as the primary manifestation:
 - Hypertrophy of an upper limb
 - Leg length inequality
 - Scoliosis
 - Congenital pseudarthrosis of the tibia

Spinal Atrophy

- Describe the pathological, clinical and laboratory findings encountered in spinal atrophy.
- Discuss the management of a given patient with spinal atrophy.

- Discuss the management of spinal curvature in the child with spinal muscular atrophy.

1.a.I.II.5 AFFECTIONS OF MUSCLE

Muscular Dystrophy

- Pseudohypertrophic muscular dystrophy.
- Facioscapulohumeral (Landouzy-Dejerine) muscular dystrophy
- Scapulohumeral (Erb) muscular dystrophy
- Myotonic dystrophy
- Congenital myopathies
- Myotonia Congenita
- Myositis Ossificans Progressive
- Bacterial Myositis
- Progressive Systemic Sclerosis (scleroderma)

Dermatomyositis

o Discuss the mode of inheritance, clinical manifestations, laboratory and electromyographical findings, pathological changes and management of a given patient with one of the following conditions affecting skeletal muscle:

- Pseudohypertrophic muscular dystrophy
- Facioscapulohumeral (Landouzy-Dejerine) muscular dystrophy
- Limb girdle muscular dystrophy
- Myotonia congenita
- Myositis ossificans progressiva
- Bacterial myositis

1.a.I.II.6 THE SPINE

Scoliosis

- o Discuss three possible aetiological factors in “idiopathic” scoliosis.
- o Classify, list the differences in curve pattern, sex distribution, incidence, management and prognosis in:
 - Idiopathic scoliosis
 - Congenital scoliosis
 - Paralytic scoliosis
- o Demonstrate his ability to measure accurately scoliotic curves.
- o List the factors of prognostic significance in “idiopathic” scoliosis.
- o Discuss the cause(s), significance, and measurement of vertebral rotation in scoliosis.
- o List the characteristics of a structural scoliotic curve.
- o List the indications for spinal instrumentation in the treatment of scoliosis.
- o List the indications for spinal fusion in the treatment of scoliosis.

- o Given a pre-operative patient with scoliosis and appropriate x-rays, select the proper fusion area, give the optimal method of correction and outline the studies necessary for adequate evaluation of respiratory function.
 - o List the indications and contraindications for use of the Milwaukee Brace and the lower profile brace in the treatment of scoliosis.
 - o List the complications of the non-operative management of scoliosis, and means to avoid them.
 - o Discuss the pseudarthrosis following spinal fusion, including causes, recognition, and management.
 - o Discuss the natural history of the untreated spinal curvature.
 - o Apply a body cast. Perform a subtalar arthrodesis.
 - o Prescribe and check out an appropriate orthosis for use in the management of a given patient with scoliosis.
-
- o Discuss the aetiological, clinical and radiological manifestations, and management of
 - o Klippel-Feil syndrome
 - o Kyphosis (congenital)
 - o Discuss the possible aetiologies, clinical and pathological findings, and management of muscular torticollis
- Scheuermann's Disease
- o Discuss the possible aetiological factors in Scheuermann's diseases.
 - o List the distinguishing clinical and radiological features encountered in Scheuermann's disease of:
 - Thoracic spine
 - Lumber spine

- o Discuss the management and prognosis of a given patient with Scheuermann's disease.

2 CONGENITAL DISORDERS

The Upper Limb

- o Classify congenital skeletal limb defects according to Frantz and O'Rahilly and according to the New International Classification.
- o Identify and/or classify the defect, describe the clinical and pathological features, outline a rational plan for management, and write an appropriate prosthetic prescription (in indicated):
 - Sprengel's deformity
 - Cleidocranial dysostosis
 - Pseudarthrosis of the clavicle
 - Ankylosis of the elbow
 - Radioulnar synostosis
 - Dislocation of the radial head
 - Madelung's deformity
 - Polydactyly
 - Syndactyly
 - Camptodactyly
 - Clasped thumb
 - Macrodactyly
 - Clinodactyly
 - Brachydactyly
 - Symphalangism
 - Trigger finger or thumb
 - Poland's syndrome

- Reduction deformities (including club hand, phocomelia, amputations, etc)
- Brachial plexus palsy
- Perform the necessary operative procedures for correction of a given patient with a simple accessory digit, trigger finger or thumb.

The Lower Limb

Foot Deformities

- Pes Planus
- List the important clinical and radiological features in the differential diagnosis between a relaxed flexible flatfoot deformity secondary to ligamentous laxity and one associated with a short tendo Achilles.
- Describe the pathology in one type of flatfoot deformity caused by each of the following:
 - primary ligamentous laxity
 - primary osseous abnormality (tarsal coalition)
 - primary joint abnormality (e.g. rheumatoid arthritis)
 - primary muscle pathology (e.g. cerebral palsy)
- Describe the differential clinical and radiological features in each of the above types of flatfoot.
- Describe the management (non-operative, operative, or both) of a given patient with one of the above types of flatfoot deformity.

Pes Cavus

- List the specific neuromuscular lesions that may lead to a cavus deformity of the foot and describe the operative approach to each.

Leg Deformities

- o Torsional
- o Discuss the normal torsional development of the femur and tibia from the pre - natal period until growth is complete.
- o Describe the postural attitudes associated with the development of abnormal femoral and tibial torsion.
- o Describe how hip rotation is altered by femoral anteversion and retroversion.
- o Describe the clinical and radiological techniques for the measurement of femoral torsion.
- o Describe the clinical techniques for measuring and recording abnormal tibial torsion.
- o List the acquired conditions attributed to increased femoral anteversion.
- o Discuss the indications for exercises, splinting and osteotomy in the treatment of abnormal femoral and tibial torsion.

Angular

- Describe the normal variation in the femoral neck shaft angle between birth and old age.
- o Classify congenital coxa vara, describe the pathological, clinical and radiological features of each.
- o Describe the management of a given child with congenital coxa vara.

- o List the causes of acquired coxa vara in children.
- o Describe the physiological angulation at the knee (genu varum, valgum) from birth through to adolescence.
- o Describe the techniques for measurement and recording of angulation at the knee.
- o Discuss the management of a given patient with genu varum or valgum.

Leg Length Inequality

- o Specify the growth contributions of proximal and distal femur and tibia.
- o List factors to consider in the evaluation of leg length inequality, with the significance of each.
- o Discuss the indications, results and complications of :
 - Epiphyseal plate stimulation
 - Surgical lengthening of a limb
 - Surgical shortening of a limb
 - Epiphyseal plate arrest
 - Epiphyseal plate stapling
 - Resection of a bony bridge across the epiphyseal plate

Given a patient with leg length inequality:

- o Make a growth prediction, using the Green-Anderson² or Moseley²⁶ methods.
- o Read scanograms and skeletal age films, using the Greulich-Pyle¹⁷ atlas.
- o Outline a plan of management of the leg length discrepancy specifying the reasons for the plan chosen.
- o Understand the principle of lengthening through the callus.
- o Perform an epiphyseodesis in the lower limb of a given patient.

- o Appreciate the concept of limb lengthening using the Ilizarov or Orthofix techniques

Torsional

- o Discuss the pathogenesis of talipes equinovarus.
- o List the pathological findings in ligaments, muscles and bones in talipes equinovarus.
- o Discuss the aetiology, management and prognosis of talipes calcaneovalgus.
- o List the major elements of the foot deformity in talipes equinovarus.
- o Describe in detail the management of talipes equinovarus in a neonate by each of the following techniques:
 - Strapping
 - Splinting
 - Casting
- o List the characteristic radiological findings of an incompletely corrected talipes equinovarus in the older child.
- o List the indications for and describe the techniques of operative treatment of talipes equinovarus in a given patient under the age of six months.
- o Describe the operative approach to each of the following patients with talipes equinovarus:
 - o Six-year-old with 150 fixed forefoot adductions
 - o Seven-year-old with fixed heel varus of 100
 - o Sixteen-year-old male with 100 fixed heel varus and 150 fixed equines
- o List three permanent stigmata of congenital talipes equinovarus.
- o Correct the deformities in a given patient with talipes equinovarus by non-operative methods.

- o Prescribe appropriate orthoses to maintain correction in patients with talipes equinovarus

Metatarsus Varus

Describe the types of Metatarsus varus and discuss the management and prognosis of a given patient with either variety.

- o Correct a given metatarsus varus deformity by serial cast application.

Tarsal Coalition

- o List the most common tarsal coalitions in order of frequency.
- o Describe the radiological techniques for demonstration of the above coalitions.
- o Describe the usual clinical findings in patients with symptomatic tarsal coalitions.
- o Discuss the management of a given child with a symptomatic tarsal coalition.

Developmental (Congenital) Dislocation of the Hip

- o Discuss the genetic, hormonal, mechanical factors that have been incriminated in the aetiology of developmental (congenital) dislocation of the hip.
- o Demonstrate the clinical findings in development (congenital) dislocation of the hip in the neonate and discuss the relative importance of each in the diagnosis.
- o List the radiological findings (including arthrography) in development (congenital) dislocation of the hip in the neonate and in the older child.
- o List the normal value for the acetabular index and C-E angle at a given age.

- o Describe the expected gross pathological findings in development (congenital) displacement of the hip in a patient:
 - o 18 months of age or under
 - o over 18 months of age
- o Discuss the management of unilateral developmental (congenital) displacement of the hip in a given child under the age of 18 months.
- o Discuss the management of unilateral developmental (congenital) displacement of the hip in a given patient between 18 months and 6 years of age.
- o List the complications of development (congenital) displacement of the hip and its treatment and discuss the management of a given patient who has developed one of the complications.
- o Obtain and maintain reduction of a given developmental (congenital) displacement of the hip by non-operative methods.

Congenital Dislocation of the Knee

- o List the possible aetiological factors in congenital dislocation of the knee including genu recurvatum.
- o Describe the optimum management of a given patient with congenital dislocation of the knee.

Vertical Talus

- o Discuss the pathogenesis of congenital vertical talus, and describe the gross pathological findings.
- o List the clinical and radiological findings that distinguish congenital vertical talus from the other types of flatfoot.

o Describe the management of a given child with congenital vertical talus including:

- Indications, techniques, and prognosis of non-operative treatment
- Indications for operative treatment
- Type of staging and procedures

Proximal Femoral Focal Deficiency See Leg Deformities – Angular

Reduction Deformities

o Discuss the principals involved in the selection of the operative procedures for the reconstruction of a lower limb deformity caused by absence (partial or complete) of the femur, tibia or fibula.

Coxa Vara

See Leg Deformities – Angular

Pseudarthrosis of the Tibia

- o Describe the radiological and pathological findings in congenital pseudarthrosis of the tibia.
- o Describe operative techniques that have been used successfully to obtain union in the treatment of congenital pseudarthrosis of the tibia with the efficacy of each.
- o Understand the principles of the electrical stimulation of bone healing in pseudarthrosis of the tibia.
- o Discuss microvascular bone transplants in the treatment of congenital pseudarthrosis of the tibia.
- o Discuss the orthotic management of congenital pseudarthrosis of the tibia.

Miscellaneous Congenital Disorders

Constricting Bands

- o Discuss the pathogenesis and gross pathological findings of congenital constricting bands.
- o List the indications for surgical excision of congenital constricting bands.
- o Upon completion of his core curriculum in paediatric orthopaedics, the trainee will have demonstrated, to the satisfaction of an attending orthopaedic surgeon, his ability to:
 - o Perform a Z-plasty to release a skin contracture.

Congenital Amputation

- Discuss the aetiology of congenital amputations.
- o Discuss the principles of prosthetic management of infant and child with upper extremity and lower extremity congenital amputations.

Arthrogryposis

- o Give the evidence supporting primary muscle and primary central nervous system aetiologies of arthrogryposis.
- o List the clinical features of arthrogryposis.
- o Discuss the optimal management of a given child with arthrogryposis.
- Marfan's Syndrome
- Ellis-van Creveld Syndrome
- Nail-Patella Syndrome
- Ehlers-Danlos Syndrome

- Trisomy-21 (Down's Syndrome)
- Turner's Syndrome
- Klinefelter's Syndrome
- Mucopolysaccharidoses
- Achondroplasia
- Larsen's Syndrome

Klippel Trenaunay Weber

- o Define; discuss the genetics, clinical and radiological features, laboratory abnormalities, management and prognosis in Marfan's Syndrome, Ellis-van Creveld Syndrome, Nail-Patella Syndrome, Ehlers-Danlos Syndrome, Trisomy-21 (Down's syndrome), and Turner's syndrome, Klinefelter's Syndrome, mucopolysaccharidoses and achondroplasia.

TRAUMATIC DISORDERS

Epiphyseal Plate Injury

clinical knowledge of the anatomy, histology and physiology of the growth plate and its reactions to injury and disease including the ability:

- o Give a classification of the growth plate injuries and their treatment.
- o Discuss the prognosis of growth plate injury and types of growth disturbance.
- o Discuss the apophyseal injuries especially as related to sports injuries.
- o Explain the development of epiphyseal bars and methods of treatment.
- o Discuss the relative growth contributions of the major epiphyseal plates and their influence on fracture management.

Differences in Fractures between Children and Adults

- o Anatomical and physiological differences in fractures and dislocations between children and adults with the implications on treatment including the ability to :
- o Discuss the complications of fractures and dislocations in general as related to children.
- o Discuss the effects of remodeling on fracture management.
- o Discuss the effects of fractures on growth on long bones and appropriate treatment to ensure limb length equality.
- o Discuss pathological fractures in children and how they differ from similar fractures in adults.

Birth Fractures

- o Birth presentation predisposed to the fractures of long bones as well as those disease entities with a high incidence of fractures at parturition including the ability to :
- o Discuss the treatment and management of birth fractures.
- o Classify birth fractures and discuss the incidence and management of specific fractures of clavicle, humerus and femur.
- o Discuss associated soft tissue birth trauma, eg brachial plexus, spinal cord injury.

Fractures in Child Abuse

- o signs and symptoms of trauma secondary to child abuse.
- o Discuss the management of the abuse child (including legal responsibility)
- o Discuss the radiological features of the abused child.
- o Discuss the epidemiology and prevalence of child abuse.

Fractures and Dislocations of Specific Bones and Joints in Children

- o knowledge of the types and treatment of fractures and dislocations of each bone and joint with particular emphasis on complications and differences in management from the comparable adult injury.

Hand

- o fractures of the phalanges, metacarpals and carpal bones including the management of intra-articular and epiphyseal injuries including the ability to;
- o Discuss the avulsion injuries of the paediatric hand and their treatment.
- o Discuss dislocation of the finger joints in children and their management.

Wrist

various types of epiphyseal injuries around the wrist including complications and management; and should be able to

- o Discuss the concept of the periosteal hinge in the treatment of fractures of children.
- o Discuss of treatment of torus and greenstick fractures in children
- o Reduction and plaster immobilization of a Type I or II epiphyseal injury distal radius.
- o Reduction and plaster immobilization of displaced (bayonet apposition) distal radius and ulna metaphyseal fractures.

Forearm Fractures in Children

- o biomechanics and treatment of fractures of the distal, middle and proximal third of the radius and ulna including the ability to :
- o Discuss the cause and management of the Monteggia fracture dislocation and its equivalents in children.
- o Discuss proper casting techniques and limb positioning for optimum treatment of various forearm fractures.
- o Discuss treatment of malunion of fractures of the forearm.
- o Reduce greenstick fracture midshaft radius and ulna.
- o Reduce displaced fracture midshaft radius and ulna by closed or open means.

Fractures and Dislocations about the Elbow.

- o Anatomy and epiphyseal development in the region of the elbow as well as the ability to:
- o Discuss the complications of elbow trauma in children.
- o Discuss fractures of the distal humerus at various ages.
- o Comment upon the investigation of elbow injuries.
- o Discuss vascular complications following elbow trauma.
- o Comment upon the treatment of complications of the supracondylar fracture in children.
- o Contrast clinically and radiologically between the various fractures encountered about the elbow.
- o Reduction and plaster immobilization of:
- o supracondylar fracture humerus (including percutaneous pinning) and dislocation of the elbow
- o insertion of traction pin in ulna for traction treatment of supracondylar fracture Monteggia fracture-dislocation.

- o Open reduction and fixation of medial and lateral epicondylar fractures.
- o The application of Dunlop's traction with and without skeletal traction.
- o Compartment pressure monitoring.

Fractures of Humeral Shaft and Shoulder.

- o Biomechanics and management of fractures of the shaft and proximal humerus in the child including the ability to:
- o Discuss the epiphyseal plate injuries about the proximal humerus including methods of reduction.
- o Discuss the relative growth contributions of the proximal humerus and its influence on treatment.
- o Discuss fractures of the clavicle and acromioclavicular joint in children; aetiology and management.
- o Proper application of Figure of Eight bandage for fractured clavicle.
- o Application of Navy Sling or Velpeau bandage.
- o Reduction and plaster immobilization of displaced fracture of proximal humerus.

Spinal Injury in Children

- o Approach to spinal injury in children re: diagnosis and management, but in particular, the differences between adult and paediatric injury.
- o Discuss cervical spine injury in children and its relation to congenital abnormalities.
- o Explain the differences in anatomy of the cervical spine between infants and adults and its influence on spinal injury.
- o Explain rotatory subluxation and facet dislocation and underlying mechanisms predisposing the child to these injuries.

- o Discuss pathological fractures of the spine in children.
- o Describe and discuss the features of spondylolysis in the child including treatment.

Pelvic Fractures in Children

- o Biomechanics and types of pelvic fractures characteristic in childhood including associated soft tissue trauma.
- o Discuss apophyseal avulsion injuries about the pelvis.
- o Explain methods of investigation and pelvic fractures and associated trauma.
- o Classify fractures of the pelvis in children
- o Discuss the investigation and diagnosis of associated adjacent soft tissue injury.

Fractures and Dislocations about the Hip in Children

- o Anatomy and development of the hip with particular emphasis on the blood supply to the femoral head at various ages as well as be able to:
- o Classify fractures of the head and neck of the femur in childhood including a discussion of management.
- o Discuss acute dislocations of the hip in childhood.
- o Discuss the management of complications of fracture dislocation of the hip with particular reference to coxa vara and avascular necrosis.
- o Discuss the Type I fracture of the proximal femoral epiphysis with respect to aetiology, diagnosis, management and prognosis.

Fractures of the Femoral Shaft

- o Anatomy, vasculature and biomechanics of the femur that predispose it to injury in childhood and as well to be able to:
- o Discuss the emergency management of fractured femurs in children.
- o Discuss the traction treatment of femoral fractures in children of different ages and complications to be avoided.
- o Explain the problems encountered in managing subtrochanteric fractures in children.
- o Discuss the indications and complications of intramedullary rodding in children.
- o Demonstrate proper application of :
- o Thomas splint
- o Skin traction techniques for management of fractured femur – distal and proximal insertion of traction pin to distal femur

Fractures about the Knee in Children

- o Anatomy of the knee , predisposing the child to specific injury.
- o Discuss the types and management of epiphyseal injuries of the distal femur and proximal tibia in children and their prognosis.
- o Explain the differences in cruciate injuries between children and adults.
- o Discuss avulsion injuries about the knee.
- o Discuss referred pain about the knee.
- o Discuss osteochondral fractures of the knee.

Fractures and Dislocations of the Patella in Children

- o influence of developmental anatomy on patella stability and be able to:
- o Discuss chondromalacia patellae.
- o Discuss operative and non-operative management of patella instability.

- o Discuss osteochondral fractures secondary to patella dislocations.

Fractures of the Tibia and Fibula

- o Influence of growth of one paired bone on the other as well as the types of fractures encountered in the tibia and fibula.
- o Describe and discuss toddler's fractures.
- o Discuss fractures involving the epiphyseal plate in the distal fibula and tibia.
- o Discuss fractures of the tibia and fibula with regard to varus and valgus angulation.
- o Discuss stress fractures.
- o Discuss fractures of the distal tibia in children including the Triplane and Tillaux fracture.
- o Demonstrate closed reduction and plaster fixation of :
 - o fractured tibia and fibula
 - o fractured proximal tibia
 - o Type II growth plate injury of the distal tibia
- o Perform open reduction and internal fixation of growth plate injury where indicated.

Fracture and Dislocation of the Foot

- o ossification pattern of the bone of the feet together with the types of fractures characteristic of each bone.
- o Discuss injuries of the talus in children together with the blood supply of the talus.
- o Classify fractures of the calcaneus.
- o Discuss avulsion fractures about the foot.
- o Discuss osteochondral fractures of the talus.

- o Discuss accessory bones of the foot.

Pathological Fractures

- o Types of paediatric conditions predisposing to pathological fractures including:

- Tumours and cysts
- Myelomeningocele
- Osteogenesis imperfecta
- Stress fractures
- Disuse osteoporosis
- Osteomyelitis
- Fibrous dysplasia

Section D:

PROGRAMME FORMAT

SCHEME OF THE COURSE OF MS ORTHOPAEDIC PROGRAM

A summary of five years course in MS ortho is presented as under:

Sr#	YEAR OF TRAINING	RESPONSIBILITIES
1	1 st year	6 Months of Orthopedic of Basic Knowledge of subject and synopsis writing and next 6 months for general surgery rotation.
2	2 nd year	Core knowledge in Surgery: Training in clinical techniques of Surgery with first two mandatory workshops and basic surgical skill workshop and mandatory three rotations. Synopsis is to be submitted at the end of 2 nd year
3	3 rd 4 th and final years	In orthopedic ward for specialized training covering all orthopedic problems. Research and Thesis Writing: Research work/Thesis writing project must be completed and thesis be submitted before the end of training.

Rotations:

<u>SR NO</u>	<u>PROGRAM TITLE</u>	<u>DURATION</u>	<u>PLACEMENT</u>
1	Orthopedics surgery	2 months	Allied hospital within first 2 years
2	Anesthesia	2 months	Allied hospital within first 2 years
3	Choice one from following ➤ Pediatric Surgery ➤ Plastic Surgery ➤ Neuro Surgery ➤ Urology	2 months	Allied Hospital FSD within first 2 years

Section E:

Assessment Plan:

Program duration	Course contents	Assessment method
At the end of 2 nd year of program	<ol style="list-style-type: none">1. Revision of core MBBS component including basic and clinical components.2. Basic knowledge and Acquiring skill related to the specialty according to the objectives made.<ol style="list-style-type: none">1. First 2 mandatory Workshops as described in course outline.3. Submission of synopsis	<p>Intermediate Examination: to be taken by university. It will include:</p> <ol style="list-style-type: none">a) Written=300b) TOACS/ OSCE /LONG CASE/ SHORT CASE=300 <p>Total Marks =600</p>

<p>At the end of 4th/5 year</p>	<ol style="list-style-type: none"> 1. Training to act as an individual while managing patient or performing any task as defined by the objectives. 2. Training to act as a teacher, researcher, leader and a player in a team. 3. Overall development of a health care professional with all the set competencies of the Program. 4. All the mandatory and specialty-oriented workshops to be completed as mentioned in the curriculum 5. Rotations as described in the curriculum completed 6. Thesis completion and submission 	<p>Final Examination to be conducted by university.</p> <p>It will include:</p> <p>a) Written=300</p> <p>b) TOACS/OSCE/LONG CASE/SHORT CASE=300</p> <p>c) Continuous internal assessment=100</p> <p>Thesis evaluation =300</p> <p style="text-align: center;">Total marks=600+100+300=</p> <p style="text-align: center;">1000</p>
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Components of Mid-term Examination

- Written: Total Marks =300
- Clinical, TOACS/OSCE = 300

Total = 600

Components of Final Examination:

- Written: 300 Marks
- Clinical, TOACS/OSCE = 300 Marks
- Continuous internal assessment =100
- Thesis Evaluation = 300 Marks

Total = 1000 Marks

Intermediate Examinations:

Intermediate examination would be conducted for the candidate getting training, at the end of 2nd calendar year of the program.

Eligibility Criteria:

1. Candidate remained on institution roll during the period approved for appearing in examination.
2. Certificate of completion of mandatory workshops.
3. Completion of Log book signed by supervisor/concerned Head of Department.
4. Certificate of submission of Ethical Review Committee approved synopsis to the university if required as per rules of synopsis submission.
5. Evidence of payment of examination fee as prescribed by the University from time to time.
6. Certificates submitted through Principal/Dean/Head of academic institution shall be accepted as valid towards the candidature of an applicant.
7. submission of application for the examination and the conduct of examination.

Intermediate Examination Schedule and Fee:

- a) Intermediate Examination at completion of two years training, will be held twice a year.
- b) There will be a minimum period of 30 days between submission of application for the examination and the conduction of examination.
- c) Examination fee will be determined periodically by the University.
- d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- e) The Controller of Examinations will issue Roll Number Slips on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee.

Written Examination:

The written examination will consist of 100 single best answer type Multiple Choice Questions. Each correct answer in the multiple-choice question paper will carry 02 marks. The short essay question will be clinical scenario or practice based, and each question will carry 10 marks.

The marks of written exam will be divided as follows:

- MCQs (single best type) = 200 Marks
- SEQ (10 marks) =100

Declaration of Results

The candidates scoring 60% marks in the written examination will be considered pass and will then be eligible to appear in the clinical and oral examination.

Clinical, TOACS/OSCE:

The clinical and TOAC/OSCE & Oral examination will evaluate patient care competencies in detail,

The examination will be of 300 total marks consisting of the following components

Clinical, TOACS/OSCE = Total Marks 300

a) 2 short Cases (50 each) = 100 marks

b) 1 Long Case = 100 marks

c) TOACS/OSCE & ORAL =100 marks (10 stations with 10 marks each)

- Each short case will be of 10 minutes duration, 05 minutes will be for examining the patient and 05 minutes for discussion.
- The long case and oral examination will each be of 30 minutes duration.

Declaration of Results

- A student scoring 60% in long case, 60% in short cases and 60% in TOACS/OSCE will be considered pass in the examination.

- A maximum total of four consecutive attempts (availed or un availed) will be allowed in the Intermediate Examination during which the candidate will be allowed to continue his training program. If the candidate fails to pass his Intermediate Examination within the above-mentioned limit of four attempts, candidate shall have to take entire Intermediate examination including written examination again

Final Examination

(At the end of 5th Calendar year of the program)

Eligibility Criteria:

To appear in the Final Examination the candidate shall be required:

1. Result card showing that the candidate has passed intermediate Examination.
2. Certificate of completion of 5 Years training duly signed by Supervisor, Head of parent Department and that of the Head of Department where rotations were done (if prescribed in the curriculum).
3. Evidence of thesis submission to Department of Examination of the University.
4. Evidence of payment of examination fee as prescribed by the university from time to time.
5. The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
6. Candidate remained on institution roll during the period required for appearing in examination.
7. Only those certificates, submitted through Principal/Dean/Head of academic institution shall be accepted.

Final Examination Schedule and Fee:

- a) Final examination will be held twice a year i.e., at least six months apart.
- b) Examination fee will be determined and varied at periodic intervals by the University.
- c) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- d) The Controller of Examinations will issue an Admittance Card with a photograph of the candidate on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee. This card will also show the Roll Number, date / time and venue of examination.

Written Part of Final Examination

- a) The written examination will consist of 100 single best answer type Multiple Choice Questions (MCQs) and 10 Short Essay Questions (SEQs). Each correct answer in the Multiple-Choice Question paper will carry 02 marks. Each Short Essay Question will carry 10 marks.
- b) The Total Marks of the Written Examination will be 300 and to be divided as follows:
 - Multiple Choice Question Paper Total Marks = 200
 - Short Essay Question Paper Total Marks = 100

Total=300

Paper 1

- MCQs 100 (2marks each)

Paper 2

- SEQs 10 (10 marks each)
 - a. Paper 1 shall comprise of hundred (100) "single best answer" type Multiple Choice Questions. Each Question shall carry 02 marks.
 - b. Paper 2 shall comprise of ten (10) Short Essay Questions, each carrying 10 marks.

Declaration of Results

- c. The candidates scoring 60% marks in aggregate of Paper 1 and Paper 2 of the written examination will be declared pass and will become eligible to appear in the Clinical Examination.

Clinical, TOACS/OSCE:

a) The Clinical Examination will consist of 04 short cases, 01 long case and TOACs/OSCE with 01 station for a pair of Internal and External Examiner. Each short case will be of 10 minutes duration, 05 minutes will be for examining the patient and 05 minutes for discussion.

b) The Total Marks of Clinical and TOACs/OSCE & Oral will be 300 and to be divided as follows:

- | | |
|---------------------------|-------------------|
| • 4 Short Cases (25 each) | Total Marks = 100 |
| • 1 Long Case | Total Marks = 100 |
| • TOACS/OSCE & ORAL | Total Marks = 100 |

Total= 300

Declaration of Results

- A student scoring 60% in long case, 60% in short cases and 60% in TOACS/OSCE will be considered pass in the examination.
- Candidate, who passes written examination, shall be allowed a maximum of Three attempts to pass Clinical/Oral examination within 02 years. However, in case of failure to pass Clinical examination within stipulated attempts the credit of passing the written examination shall stand withdrawn and candidate shall have to take entire examination including written examination, afresh.
- Candidate who has completed his/her training along with all the requirements mentioned in the curriculum, shall have to appear in the written of final examination at least once within a period of 08 years (from the time of induction in the training). Failure to comply with this, the matter will be referred to the competent authority through proper channel for final decision.

Synopsis and Thesis Writing:

Thesis writing must be completed and thesis be submitted at least 6 months before the end of final year of the program.

Thesis evaluation & defense will be carried out at the end of 5th calendar year of MS.

Submission / Evaluation of Synopsis

- a) The candidates shall prepare their synopsis as per guidelines provided by the Advanced Studies & Research Board, available on the university website.

- b) The research topic in clinical subject should have 30% component related to basic sciences and 70% component related to applied clinical sciences. The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, to collect & analyze the data.

- c) Synopsis of research project shall be got approved by the end of the 2nd year of MS program. The synopsis after review by an Institutional Review Committee, shall be submitted to the University for consideration by the Advanced Studies & Research Board, through the Principal / Dean /Head of the institution.

Submission and evaluation of Thesis Evaluation (300 Marks)

1. The Thesis shall be submitted to the Controller of Examination through Head of Institute, duly signed by the Supervisor, Co-Supervisor(s) and Head of the Department.
2. Submission of Thesis is a prerequisite for taking Final Theory Examination.
3. Examiners shall be appointed by the Vice chancellor on recommendation of Controller of Examination from a panel approved by Advance Studies & Research Board for evaluation of thesis.
4. All MS thesis shall be evaluated by two examiners, one internal and one external (The supervisor must not be the evaluator)
5. Thesis defense shall be held after approval of evaluation reports by Advanced Studies & Research Board.

6. Thesis defense shall be conducted by the examiners who evaluated Thesis of the candidate.
7. The candidate scoring 60% marks in Thesis defense examination will be declared as pass in the examination.

Continuous Internal assessment

It will consist of professional growth oriented student-centered integrated assessment with an additional component of formative assessment and measurement-based summative assessment

Attendance

- Students joining postgraduate training program shall work as full-time residents during the duration of training and maximum 2 leaves are allowed in one month, and should take full responsibility and participation in all facets of the educational process. The period of training for obtaining degrees shall be four completed years .

Presentations

- In addition to the conventional teaching methodologies interactive strategies will also be introduced to improve both clinical and communication skills in the upcoming consultants. Presentations must be conducted regularly as scheduled and attended by all available faculty and residents. As a policy, active participation of the postgraduate resident will be encouraged. Proper written feedback will be given for these presentations and that will be a part of Resident's Portfolio as well. Reflection of the events to be written by the residents as well and must be included in their portfolios.

Task evaluation

- This competency will be learned from journal clubs, review of literature, policies and guidelines, audit projects, medical error investigations, root cause analysis and awareness of healthcare facilities. Active participation and ability to fulfill given tasks will be encouraged. Written feedback must be given and documented to be included in portfolio

Continuous Internal Assessment format (100 Marks)

1. The award of continuous internal assessment shall be submitted confidentially in a sealed envelope.
2. The supervisor shall submit cumulative score of internal assessment of all training years to be added together to provide a final cumulative score of Continuous Internal Assessments of all the trainees to the Head of the Department/ Dean of Post Graduate studies.
3. The Head of Department/ Dean shall submit the continuous internal assessment score through the Principal/ Registrar office to the Examination Department of the University. Score of continuous internal assessment once submitted shall be final and cannot be changed subsequently under any circumstances.
4. The weightage of internal assessment in the final examination will be 10%.
5. Continuous Internal Workplace Based Assessments will be done by the supervisors, that may be based on but not limited to:
 - a. Generic and Specialty Specific Competency Assessments
 - b. Multisource Feedback Evaluations
 - c. Assessment of Candidates' Training Portfolio

TOOLS OF ASSESSMENT FOR THE COURSE:

TOOL USED:	DOMAIN TESTED:
MCQs	Knowledge
SEQs	Knowledge
TOACS/OSCE	Knowledge. Skill Attitude
PRESENTATIONS (wards, seminars, conferences, journal clubs)	Knowledge. Skill Attitude
Portfolios and log books.	Skill

	Attitude
Short cases.	Knowledge Skill Attitude
Long cases	Knowledge Skill Attitude
Continuous internal assessment	Skill Attitude
Feedback from department where rotation is being conducted.	Knowledge Skill

	Attitude
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Section F

Award of MS ORTHOPEDICS Degree

A candidate having declared successful in all the components of examination i.e.

Theory, Clinical and Thesis shall be declared pass and shall be conferred degree in
MS Orthopedics

Section G: Log Book

As per format approved by the university, available on university website

Section H

Portfolio:

As per format approved by the university, available on university website

Section I

Paper Scheme

Intermediate Examination

written

Sr No.	Topic:	Number Of MCQs	Number Of SEQ
1.	Principles of general surgery	70	7
2	Orthopedics related question	30	3

TOACS Stations Distribution:

Final Examination

written

Sr No.	Topic:	Number Of MCQs	Level	Number Of SEQ
1.	GENERAL ORTHOPAEDICS	15	C1, C2, C3	02
2.	RECONSTRUCTIVE PROCEDURES Hip, Knee, Shoulder, Ankle, Elbow	10	C1, C2	01
3.	FRACTURES AND DISLOCATIONS IN CHILDREN	10	C1, C2, C3	01
4.	FRACTURES AND DISLOCATIONS IN Adults	15	C1, C2, C3	02
5.	CONGENITAL AND DEVELOPMENTAL DISORDERS	05	C1, C2	01
6.	SPORTS MEDICINE	10	C1, C2, C3	01
7.	ARTHROSCOPY	05	C1, C2	

8.	THE HAND Wrist Disorders Paralytic Hand	05	C1, C2	
9.	Disorders of FOOT AND ANKLE	05	C1, C2	
10.	Metabolic disorders	10	C1, C2, C3	01
11.	Tumours	10	C1, C2, C3	01

TOACS Station distribution:

Section J

Resources and references (books and other resource material)

RECOMMENDED BOOKS

1. Campbell's operative Orthopaedics
2. Rockwood and Green
3. Lowel and Winter Paediatric Orthopaedics
4. Biomechanics
5. AO manual
6. Macrae Clinical Methods
7. Manual of acute Orthopaedic therapeutics
8. Pathology by Robins
9. Pyes surgical handicraft
10. Turek's Orthopaedics

RECOMMENDED JOURNALS

1. International Orthopaedics
2. Journal of Bone and Joint Surgery (American/British editions)
3. Clinical Orthopaedics
4. Orthopaedic Clinics of North America
5. Spine
6. Journal of Hand Surgery
7. Journal of Paediatric Orthopaedics
8. Trauma
9. Journal of Pakistan Orthopaedic Association

e-Library

1. Orthopaedic Hyperguide
2. SICOT Telediagnosics
3. Pubmed/Google/Altavista

Section K

List of authors and contributors

- Dr. Rana Dawood Ahmad Khan (Head of orthopediac)

Signed by head of Department