

MASTER OF ORTHOPAEDIC SURGERY (MORTH)

STUDENT HANDBOOK



Dept. of Orthopaedics,
Traumatology & Rehabilitation,
Kulliyah of Medicine,
IIUM

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MASTERS OF ORTHOPAEDIC SURGERY (M. ORTH)

1.0 INTRODUCTION

Education remains a top priority in Malaysia, as the nation's growth and development hinge on achieving excellence in this sector. Malaysia continues to invest in world-class educational opportunities for all, with the International Islamic University Malaysia (IIUM) standing as a distinguished institution in this pursuit.

Orthopaedics as a specialty still requires further development in Malaysia. As of 2024, there are approximately 69 orthopedic surgeons in Malaysia, a figure that remains below the desired ratio of 1:30,000 for a developed country. The distribution of orthopedic surgeons between the public and private sectors continues to be uneven, with a significant portion serving in private healthcare facilities. To meet the World Health Organization (WHO) recommendation, Malaysia must substantially increase the number of orthopedic specialists.

Currently, postgraduate training in orthopaedic surgery is offered at several universities, including IIUM, UKM, UM, USM, UPM, UNIMAS, KPJUC and UiTM. These institutions play a crucial role in addressing the shortage of orthopedic surgeons and ensuring the country produces well-rounded professionals in the field. The structured postgraduate training programmes aim to equip future orthopedic surgeons with the necessary expertise to meet Malaysia's growing healthcare demands.

The Department of Orthopaedics, Traumatology, and Rehabilitation at the Kulliyah of Medicine, IIUM, launched its Master of Orthopaedic Surgery programme in 2008, marking the first clinical specialist training programme within the Kulliyah. This four-year programme is designed to equip doctors with the expertise required to become orthopedic surgeons.

2.0 COURSE OBJECTIVES AND LEARNING OUTCOMES

2.1 Programme Learning Objectives

Upon three to five years of successful completion of the programme, the graduates will be able to:

- i. Evaluate the best up to date medical and orthopaedic knowledge and skills in the delivery of effective and efficient patient-centered care.
- ii. Display professionalism, ethical conduct, and commitment towards intra-and inter-personal development and lifelong learning as Murabbi in line with Islamic worldview.

- iii. Develop leadership in the field of Orthopaedics and contribute to the improvement of education, training and research.

2.2 Programme Learning Outcomes

At the end of the programme, students will be able to:

1. Synthesize comprehensive understanding of the current medical and Orthopaedic concepts, principles and knowledge, in a safe, effective and evidence-based manner for optimal patient care and training.
2. Analyze complex problems using current evidence related to patient care that may lead to the creation of new solutions and practices that satisfy peer reviews and international standards in Orthopaedics.
3. Display mastery of clinical and surgical skills for the diagnosis and management of specialized Orthopaedic conditions, personalized to the patient.
4. Compose effective, ethical, and professional communication towards patients and their families, whilst working collaboratively, conveying insights and solutions to peers, scholarly community and society at large in the field of Orthopaedics
5. Integrate current concepts in orthopaedic technologies, medical informatics, and quantitatively analyze data using related statistical software to engage in evidence-based practice and research.
6. Practice leadership, advocacy and teamwork in decision making, supervision, training, research and administrative management include quality improvement in the workplace to contribute to Orthopaedic fraternity, and the society at large.
7. Display capability for personal advancement and lifelong learning through continuous academic and professional development at the same time incorporating an entrepreneurial mindset.
8. Develop professional values, attitudes and ethical conduct to expected standards and beyond in Orthopaedic practice and research whilst demonstrating adherence to universal values in line with the Islamic worldview, legal, professional and ethically sound codes of practice.

3.0 COURSE STRUCTURE AND FORMAT

3.1 Academic Year (Year 1 – Year 4)

The programme is divided into 4 years aimed at allowing progressive mastery of knowledge, skills and attitude, increasing responsibilities and independence.

Year 1 (Early Phase)

The early phase of specialty training focuses on building essential knowledge and skills. Trainees work closely with trainers to lay a strong foundation for future development. The main focus during this phase is trauma patient management, including learning complex fracture treatment systems and mastering surgical instruments and implants. Trainees are also expected to develop strong assessment skills to safely and effectively manage severely injured patients of all ages, including those with multiple health conditions.

Successful completion of assessments at the end of this phase is required to progress to advanced training.

Year 2 – 4 (Advance Phase)

During the advanced phase of training, trainees will refine their trauma management skills while gaining proficiency in elective orthopaedics. Over three years, they will build increasing expertise in trauma and orthopaedic practice, essential for a newly qualified specialist working in a general hospital.

In the final year (Year 4), trainees must demonstrate the ability to manage aspects of independent practice safely and reliably, while ensuring that all patient care decisions are thoroughly discussed and approved by a senior specialist.

3.2 Professional, Sejahtera and Personal Enhancement

This course provides workshops and activities pertaining to the enhancement of the trainees' professional and personal development. This course also will provide the opportunity for the trainees to consolidate their knowledge, skills, practice and professionalism in all subspecialties including orthopaedic rehabilitation. Below is the workshop that the trainees will be attending during this course:

1. Communication skills in oral examination & stress management skills in facing clinical examination
2. Strategies to perform on examination day
3. Synchronization of physical examination sequences
4. Clinical examination reflection

3.3 Research Project

Each candidate is required to undertake a structured research project over the course of their four years of study. The project must be based on orthopaedic-related topics and is designed to cultivate critical thinking, evidence-based practice, and scholarly contributions to the field. Successful completion of this research project, culminating in the submission of a dissertation or an extended manuscript, is a mandatory prerequisite before students are permitted to attend the final exit examination. This requirement ensures that graduates demonstrate not only clinical proficiency but also the ability to engage in scientific inquiry and academic writing at a professional level.

4.0 COURSE PROGRAMME

4.1 Activities

Clinical discussion	Handover Round (MPO)
	Ward round
	Journal Club
	Grand Ward Round
	Interdepartment Conference (CPC)
Practical learning	CME
	Elective OT (Supervised OT)
	Emergency OT (Unsupervised OT)
	Oncall (active)
	Oncall (Passive)
Problem based learning	Census & Morbidity / Mortality
	Clinical case presentation
	Pre-OP and Post-OP meeting
	Clinic with Consultant

- **Journal Review:** The lecturers or supervisors are responsible for organizing the meeting. The students are required to present new articles from selected journals. The students are requested to give their opinion or critique during presentation.
- **Clinical case Presentation:** The lecturer or supervisor will determine the cases for discussion.
- **Interdepartmental Clinicopathological Conference:** The students are responsible for presenting and participating in these conferences.
- **Census & Mortality and morbidity meeting**
- **Pre-OP and post-OP meeting:** Clinical discussion made between the lecturer and the students before and after an operation theatre session.

4.2 Curriculum Structure

4.2.1 Course Programme/Study Plan

Program	MASTER OF ORTHOPAEDIC SURGERY (IIUM)											
Phase	Phase 1			Phase 2								
Year	Year 1			Year 2			Year 3			Year 4		
Duration	4 months	4 months	4 months	4 months	4 months	4 months	4 months	4 months	4 months	4 months	4 months	4 months
Course code	ORTH 7119	ORTH 7129	ORTH 7139	ORTH ****	ORTH ****	ORTH ****	ORTH ****	ORTH ****	ORTH ****	ORTH ****	ORTH ****	ORTH ****
	General Traumatology 1	General Traumatology 2	General Traumatology 3									
Research Project course code	ORTH 7102 Orthopaedic Research 1 (Research Proposal)			ORTH 7205 Orthopaedic Research 2 (Data Collection and Interpretation)						ORTH 7403 Orthopaedic Research 3 (Dissertation Writing)		
Unicore/ Kulliyah required course code	RESM 7211 Research methodology STAT 7211 Biostatistics ISOR 7212 Islamization of Human Knowledge in											

	Medicine			
Formative Assessment	WPBA Assessment Thesis Proposal Presentation EOY1 Review	WPBA/EOP Assessment Thesis Progress Presentation EOY2 Review	WPBA/EOP Assessment Thesis Progress Presentation EOY3 Review	WPBA/EOP Assessment Thesis Result Presentation EOY4 Review
Summative Assessment				Exit Examination

For ORTHO****, the courses will follow a rotational structure based on the courses listed below.

1. ORTH 7219 Arthroplasty
2. ORTH 7229 Spine Surgery
3. ORTH 7239 Advanced Trauma and Limb Reconstructive Surgery
4. ORTH 7319 Foot and Ankle Surgery
5. ORTH 7329 Upper Limb & Microsurgery
6. ORTH 7339 Arthroscopy & Sport Surgery
7. ORTH 7419 Orthopaedic Oncology
8. ORTH 7429 Paediatric Orthopaedic
9. ORTH 7439 Professional, Sejahtera and Personal Enhancement

4.2.2 Research Project

Research project Gantt Chart

	Year 1			Year 2			Year 3			Year 4		
	4/12	4/12	4/12	4/12	4/12	4/12	4/12	4/12	4/12	4/12	4/12	4/12
Literature Review & Research Proposal												
Data Collection & analysis												
Writing & submission												

*** Dissertation should be sent 8 months prior to the Exit Examination**

4.2.3 Clinic

- i. Year 1 students attend general ortho clinic for 1 year (trauma posting)
- ii. Students doing subspecialty rotation must attend the subspecialty clinic. (2nd year onwards)
- iii. Students doing subspecialty rotation attend the general clinic during days when there is no OT or subspecialty clinic.

Year 2, 3 & 4 (SASMEC @IIUM) Clinic Schedule

Day	Clinic
Monday	Advance Trauma, Hand & Microsurgery, Paediatric Orthopaedic Clinic, General Trauma
Tuesday	Arthroplasty, Sport Medicine, General Trauma, Oncology
Wednesday	Foot & Ankle, Spine, General Trauma, Sport Medicine
Thursday	Spine, Hand & Miro surgery, Sports Shoulder & General Trauma
Friday	Sport Medicine

4.2.4 Operation Theatre SASMEC @IIUM for Orthopaedic Cases

Trauma OT every Monday and Friday

4.2.5 Weekly Teaching Programme (Incampus)

Monday		Tuesday		Wednesday		Thursday		Friday	
8.00 - 9.00 am	Handover Round & Ward Round*	8.00 - 9.00 am	Handover Round & Ward Round*	8.00 - 9.00 am	Handover Round & Ward Round*	8.00 - 9.00 am	Handover Round & Ward Round*	8.00 - 9.00 am	Handover Round & Ward Round*
9.00 am – 1.00 pm	Clinic with Consultant	9.00 am – 1.00 pm	Clinic with Consultant	9.00 am – 1.00 pm	Clinical Case Presentation*	9.00 am – 1.00 pm	CME (Subspecialty)	9.00 - 10.30 am	CME & Journal Club*
2.00 pm – 5.00 pm	Interdepartment Conference* (Radiology/ Pathology) Morbidity & Mortality meeting*	2.00 pm – 5.00 pm	Pre-OP/Post-OP meeting	2.00 pm – 5.00 pm	Supervised OT (Elective OT)	2.00 pm – 5.00 pm	Supervised OT (Elective OT)	10.30 – 12.00 pm	Grand Ward Round*

5.00 pm – 6.00 pm	Oncall	5.00 pm – 6.00pm	Oncall	5.00 pm – 6.00 pm	Oncall	5.00 pm – 6.00pm	Oncall	2.45 – 4.15 pm	Census*
								5.00 pm – 6.00pm	Oncall

Indicators

	All lecturers involved
	Done by each specialty rotation as below
	Oncall: Based on monthly oncall schedule, one day involved 1 consultant and 1 Specialist (including Saturday, Sunday and public holidays)

5.0 SUPERVISOR, TRAINER/EXTERNAL CLINICAL SUPERVISOR AND TRAINEE

In the programme, the supervisor, trainer, and trainee work together closely. The supervisor oversees the trainee's overall progress. They set goals, monitor performance, and ensure assessments are completed. They guide the trainees throughout the training period. The trainer provides hands-on teaching. They supervise the trainee during clinical work, teach surgical skills, and give regular feedback. The trainee is responsible for learning, attending training sessions, and improving based on feedback. They work closely with both the supervisor and trainer.

The relationship is collaborative:

- The supervisor ensures progress,
- The trainer/external clinical supervisor teaches and assesses,
- The trainee learns and applies skills.

All three roles are essential for successful and safe training.

5.1 Roles and Responsibilities

5.1.1 Supervisor

Purpose: Acts as a mentor for individual trainees throughout their training and supervise their Research, Audit, and Quality Improvement (RAQI) projects.

Duties:

- Establish trusting and confidential relationships with trainees.
- Contributes to learning agreements for structured training.
- Monitors trainee progress and provide guidance.

- Supports trainers in ensuring effective assessments.
- Liaises with trainers, programme coordinators, and training committees to address challenges.

Qualifications & Training:

- Must be at least two years post-gazettement.
- Must complete Trainer Training (TTT) Level 1 & 2 (Level 3 preferred).
- Requires expertise in research methodology and mentoring.

5.1.2 Trainer/External Clinical Supervisor

Purpose: Responsible for coaching and instructing trainees in acquiring and developing core competencies in general Orthopaedics or sub-specialties.

Duties:

- Provides clinical coaching and structured learning opportunities.
- Conducts workplace-based assessments (PBA, CbD, Mini-CEX).
- Facilitates learning agreements and sets expectations at the start of each rotation.
- Supervises surgical training and decision-making.
- Prepare trainer reports, evaluating progress and competence.
- Works closely with supervisors and training committees to ensure curriculum adherence.

Qualifications & Training:

- General Orthopaedic trainers: At least one-year post-gazettement.
- Subspecialty trainers: At least three years of subspecialty experience.
- Must complete Trainer Training (TTT) Level 1 & 2.

5.1.3 Trainee

Purpose: Undergoes structured postgraduate training to develop into a competent Orthopaedic specialist.

Duties:

- Completes clinical rotations, assessments, and practical training.
- Engages in Procedure-Based Assessment (PBA), Case-Based Discussion (CbD), Mini-CEX.
- Maintains an up-to-date surgical logbook.

- Actively participates in training, research, audit, and professional development.
- Ensures compliance with curriculum standards.

Training Structure:

- Must achieve satisfactory assessments for each rotation.
- Completes exit essential learning activities (ELA).
- Undergoes formal Exit Examination before gazettelement and registration as a specialist.

6.0 ASSESSMENT

- Assessment in Orthopaedics has three key purposes:
 1. To encourage and monitor learning (through Formative tools).
 2. To evaluate whether the trainee is ready to progress through the stages of the programme (through Summative tools).
 3. To generate and evaluate the evidence that the trainee is able to care for patients in a safe and effective way as a specialist.
- **Types of assessments**
 - **Formative Assessments (Ongoing)**

These are continuous assessments meant to guide learning and give feedback.

 1. End of posting assessment (every 4 months for year 2, 3 & 4); Clinical exam and viva assessment ***Refer Clause 6.2**
 2. Research project: Thesis Proposal Presentation, Research Ethical Approval, Thesis Progress Presentation and Thesis Result Presentation.
 3. Procedure-Based Assessment (PBA): Evaluates performance during real procedures (3 per rotation)
 4. Case-Based Discussion (CbD): Assesses clinical reasoning and decision-making through discussion of real cases. (2 per rotation)
 5. Mini Clinical Evaluation Exercise (Mini-CEX): Observes short clinical interactions to assess skills like communication, diagnosis, and professionalism (7 per rotation)

6. Clinical Reports / Case write up: Written detailed account of a patient's symptoms, diagnosis, treatment, and follow-up in a specific area. (Year 1 (2 reports), Year 2,3 & 4 (1 report each posting) **Refer Clause 6.1*
7. Logbook of Operative Experience: Records surgical procedures done, showing progression and exposure. **Refer Clause 6.1*
8. Trainee Portfolio: A comprehensive collection of evidence including learning activities, reflections, assessments, and achievements.
9. Research, Audit and Quality Improvement (RAQI): Involves audits, critical appraisals, research protocols and reports.

○ **Summative Assessments (Decision-Making Points)**

These determine trainee progression or completion of training.

1. End-of-Year (EOY) Assessment: Comprehensive review of trainee's performance for the year. This assessment will suggest trainees' yearly progression and proceeding to Exit Examination. (Assessment of documents by department and Subcommittee of Orthopaedic Training -SCOT)
2. Research Project: Trainees need to submit a research paper / manuscript at least 8 months before sitting for Exit Examination.
3. Exit Examination (OSC Exit Examination): Orthopaedic Specialty Committee Exit Examination during end of final year (Format: BAQ, Essay, OSCE, viva, clinical long case and short cases) **Refer Clause 6.2*

● **Assessment Events/Processes**

1. Learning Agreement – Done at the beginning of each academic year and rotation with supervisor/trainer/external clinical supervisor.
2. Four-Monthly Training/ Rotation Review
 - a. End of posting assessment
 - b. Trainer End of Rotation Review: Focuses on clinical performance and learning activities.
 - c. Supervisor Report: Summarises progress, attitude, and readiness for progression.

6.1 Periodic Clinical Competency Assessment

6.1.1 Orthopaedics Surgical Logbook

Templates for the surgical logbook will be distributed to each student during the Department Taaruf programme at the beginning of the training.

The logbook of the surgical skills and procedures is divided according to the trauma and subspecialty rotations that will be go through by each student.

Students are required to maintain an up-to-date record of the procedures they have performed or participated in, either as assistants or done on their own. The logbook must be regularly updated and will be reviewed by the supervisors at the end of each rotation

6.1.2 Orthopaedics Clinical Reports

Satisfactory completion of clinical reports is a criterion for passing the rotation.

- i. The trainees are required to write **10* clinical reports** which include the following areas:
 - a) General orthopaedics
 - b) General Traumatologyd) Orthopaedic Oncology
 - e) Arthroplasty
 - f) upper limb, Hand and microSurgery
 - g) arthroscopy and Sport surgery
 - h) Spine Surgery
 - i) Foot and Ankle Surgery
 - j) Advance trauma and limb reconstruction
 - k) Paediatrics Orthopaedics
 - l) Islamic Input in Orthopaedics (**COMPULSORY**)
- ii. Write a summary of the case and make sure all relevant data such as X-ray and other investigations are available.
- iii. Review the literature regarding the problem, making an annotated bibliography.
- iv. The clinical reports must be reviewed by the trainer/external clinical supervisor/supervisor and achieve satisfactory standards.

- v. Students should have 2 satisfactory completions of clinical reports during Year 1 of training.
- vi. A compilation of 10 clinical reports must be submitted to the department as part of the department graduation requirements.

***One publication in a referred journal is equivalent to TWO clinical reports.**

6.1.3 Trainer / External Clinical Supervisor Evaluation Reports and Supervisor Reports

Trainees should achieve a satisfactory level of competency at each posting or attachment. The evaluation reports will assess the trainees' performance in terms of their cognitive skills, technical skills, decision making skills, communication skills, management and leadership skills, attitude and their professional conduct throughout the attachment.

Programme coordinator will be responsible to ensure that the reports are accessible and those who fail to achieve a minimum requirement or deemed unsatisfactory by their respective trainer will be acted upon accordingly.

6.1.4 End Posting Assessment

This assessment is a formative assessment and will be performed at the of subspecialty rotation in Department of Orthopaedic, Traumatology and Rehabilitation, IIUM. It consists of clinical long case and viva examination.

6.1.5 Guidelines for Research Project

Every trainee will be given the opportunity to participate in a workshop on Research Methodology where they will develop skills in writing a research proposal, conducting the research project and to report the findings.

- i. Student needs to identify suitable topics for the research project and discuss the topics with your supervisor.
- ii. Review the literature on the topic, keeping an annotated bibliography.
- iii. Develop a research proposal with guidance from the supervisor.
- iv. Present the proposal in your unit. The IIUM liaison supervisor will also be present at the presentation.
- v. Submit and present the proposal to the Department.

- vi. Once the proposal is approved, ethical clearance should be obtained before data collection starts.
- vii. The completed dissertation must be submitted 8 months before the Exit examination. It must follow the Kulliyah guidelines/format
- viii. Every trainee should give an oral presentation (research findings presentation) to the members of the Department before submission for assessment by the Internal Examiner.
- ix. Students are required to meet the minimum standard criteria of publication based on the Publication Equivalence. (Refer to Postgraduate Regulation 2022)
 - Minimum of publication equivalence is 0.3 (includes poster, non-indexed conference proceedings or any publication recognized by Kulliyah of Medicine)

6.2 Examinations

6.2.1 Exit Examination (OSC Part 2)

No candidate shall be permitted to take the Part II Examination unless the following have been fulfilled:

- i. Completion of all training requirements (e.g., logbook, portfolio, assessments)
- ii. Supervisor's approval and completed End-of-Year Assessments.
- iii. Fulfilment of minimum years of training. (4 years, up to 7 years max)
- iv. Submitted the dissertation not later than 8 months before the Exit Examination
- v. A candidate whose dissertation is deemed unsatisfactory by the Committee of Examiners may be referred to for further work in his research report over a period of time to be determined by the Committee of Examiners except that such period of time as determined shall not exceed six months on any one occasion. At the end of the prescribed period the candidate shall be required to submit the research report for re-examination. A candidate who fails to submit the research report by the end of the prescribed period for re-examination shall be deemed to have failed the research report.
- vi. A candidate shall be permitted to submit his research report for re-examination on not more than two occasions.
- vii. A candidate who fails the research report after the second re-examination shall be deemed to have failed the dissertation and shall not be permitted to repeat the programme of study except in special circumstances on the recommendation of the Kulliyah of Medicine and with approval of the Senate.

6.2.3 Examination Structure

The Exit Examination may include components such as:

1. Theory Exam: Essay 1, Essay 2 and Best Answer Questions (BAQ)
2. Clinical Exam: Objective Structured Clinical Examination (OSCE), Viva Voce, Clinical Long Case & Clinical Short Case

6.2.4 Requirements for Passing an Examination

A candidate shall be deemed to have passed the Examinations prescribed upon passing both Theory and Clinical Exam and meet the minimum score set by the Orthopaedic Specialty Committee (OSC)

6.2.5 Re-Examination

- A candidate who has failed the Exit Examination may be permitted a re-examination on three separate occasions at six monthly intervals.
- If the candidate has passed the theory component in a previous attempt, they may proceed directly to the clinical examination on the second or third attempt. However, if the candidate fails the clinical component on their third attempt, they will be required to retake the entire examination (both theory and clinical) on their fourth attempt.
- A candidate who fails the re-examination on the third occasion shall be deemed to have failed the Exit Examination and shall not be permitted to repeat the programme of study except in special circumstances on the recommendation of the Kulliyah of Medicine and with approval by the Senate.

6.2.7 Book Award for Master of Orthopaedic Surgery

A candidate may be awarded the book award with the following conditions:

- i. Has passed with the best marks in the Exit Examination.
- ii. Has not failed in any component of the prescribed Examination.
- iii. Has not repeated the prescribed Examination or any part of the programme of study except on medical or compassionate grounds approved by the Department / Kulliyah.

and

- iv. Has shown excellent reports in continuous assessment.
- v. Has demonstrated excellent leadership, personal and interpersonal characteristics.

7.0 ANNUAL LEAVES, POSTPONEMENT, DEFERMENT / SUSPENSION AND TERMINATION

7.1 Annual Leave & Sick Leave

- Candidate's application for leave is subject to approval by Department.
- Annual leave is allowed for up to 14 days per semester.
- Total Sick Leave allowed is 7 days per semester. Quarantine leaves to take care spouse or children is not included in the sick leave.
- Only under special circumstances will leave exceeding these periods are considered and will be determined on a case-by-case basis by the Department.

7.2 Postponement, Deferment / Suspension

- Postponement of registration into the programme (6 months) is allowed but with valid reasons and with prior notification to the University/Department at least 1 month before the date of registration.
- A candidate who is already in the course may apply for suspension / deferment of 1 or 2 semesters but with valid reasons and with prior notification to the University / Department at least 1 month before the date of the request.
- Both the above situations must be approved by the Head of Department and then by the Kulliyyah Postgraduate Committee.

7.3 Termination of Candidature

The candidate may decide voluntarily to terminate his tenure in the course. Otherwise, termination is as follows:

- Infringement of Act and Regulations as stipulated by IIUM.
- Violation of civil law and order.
- Problems with attitude and behavior.
- Unsatisfactory performance or deterioration in study.
- Mental or physical disability.
- Indulgence in subversive activities.
- Procurement of examination questions and answers.

8.0 SYLLABUS

The Expected levels are as follows:

Expected Levels of Clinical Knowledge

LEVEL	Descriptor for Clinical Knowledge	Example: Wound healing
1	<p>Basic</p> <ul style="list-style-type: none"> Normal anatomy, physiology, pathology Able to identify signs and symptoms of common conditions as listed in syllabus by taking history and perform physical examination relevant to the condition/affected area Aware of need for referral 	<p>Normal anatomy of the skin Function of the skin Wound healing processes History of wound and associated conditions, examination of wounds Triaging, and prioritisation of management</p>
2	<p>In addition to the above,</p> <ul style="list-style-type: none"> Knows of normal biomechanics Able to interpret history, physical examination findings in pathological conditions Able to describe the types of conditions and how to investigate them 	<p>Factors affecting healing of different types of wounds – patient/general factors (neurovascular, comorbidities nutrition etc), wound/local factors (infection, wound edges) Wound assessment and classification according to pathology ABSI and other investigations to confirm/rule out diagnosis or cause of wound – includes knowing when and how to correctly obtain specimens for culture & sensitivity</p>
3	<p>In addition to the above,</p> <ul style="list-style-type: none"> Able to interpret investigations to reliably diagnose and treat specific condition Able to apply clinical anatomical knowledge to conditions/injuries 	<p>Able to interpret ABSI and investigations results then implement a general treatment plan for wound management Able to manage acute wounds</p>
4	<p>In addition to the above,</p> <ul style="list-style-type: none"> Able to describe the different types of conditions and comment in general terms about the treatment including relevant rehabilitation modalities Able to discuss the evidence-based treatment options Able to recognise complications of the condition or the treatment 	<p>Knows the different dressing methods, options and materials which can aid in improved wound healing – types of dressing materials, solutions and techniques (negative pressure wound therapy, silver dressing, saline vs antiseptic solutions, regenerative options)</p>
5	<p>In addition to the above,</p> <ul style="list-style-type: none"> Knows of the specifics of diagnosis/condition, sub-types and treatment options Able to discuss the treatment options and derive an algorithm that is appropriate to follow Able to treat complications 	<p>Detail a holistic treatment plan for the patient which includes rehabilitation, nutrition etc Able to manage chronic non-healing or atypical wounds (e.g.: TB marinum wounds) Able to monitor treatment progress and take appropriate action in event of complication or worsening of the patient's condition</p>
6	<p>Advanced</p> <p>In addition to the above,</p> <ul style="list-style-type: none"> Keeps up to date with the recent advances Able to diagnose and treat complex cases 	<p>Knows in great detail all surgical and nonsurgical options of treatment of complex wounds (such as large sacral pressure ulcers) Knows the principles of flaps to aid in wound coverage</p>

Expected Levels of Knowledge for Imaging

LEVEL	Descriptor for Knowledge for Imaging	Example: Radiograph
1	<p>Basic</p> <ul style="list-style-type: none"> Principles of the imaging modality and how it helps with diagnosis Normal anatomy and its correlation to Imaging 	<p>Knows the anatomy of the body part to be radiographed Knows in general how a radiograph is obtained Knows that radiographs are good for visualisation of bone, calcified tissue, and implants, but have some limitations with respect to visualisation of soft tissue (skin, ligaments, nerves etc)</p>
2	<p>In addition to the above,</p> <ul style="list-style-type: none"> Knows the indications and contraindications/precautions of use of the imaging modality Knows how to select the appropriate and basic imaging views or modalities based on patient's history and physical examination findings 	<p>Indication for the use of radiograph including identifying fractures, dislocations Contraindication/precaution in women of childbearing age, healthcare workers (repeated exposure), precautions in children Knows that to identify a fracture will need at least 2 views (AP and Lateral) of the affected part and 2 joints (proximal and distal joints)</p>
3	<p>In addition to the above,</p> <ul style="list-style-type: none"> Able to interpret imaging findings to reliably diagnose a specific condition 	<p>Able to read and identify radiographic features to diagnose fracture, dislocation, degenerative joint disease, deformities, osteomyelitis, benign bone lesions, tumours, thoracic injury etc</p>
4	<p>In addition to the above,</p> <ul style="list-style-type: none"> Knows of different/specialised views or imaging techniques to aid in diagnosis 	<p>Indication for specialised views and how to obtain them e.g., valgus and varus stress views of the knee, Judet views of the pelvis, use of contrast etc Knows of fluoroscopy, computed tomography</p>
5	<p>In addition to the above,</p> <ul style="list-style-type: none"> Able to discuss the imaging options in detail Able to recognise complications of use of the imaging modality and its alternative options 	<p>Complications: 1. Radiation exposure injury to healthcare professional and patients – fluoroscopy and CT have more radiation exposure than radiographs. 2. Leakage of dye in angiography – reactions, signs Knows signs and symptoms of radiation exposure</p>
6	<p>Advanced</p> <p>In addition to the above,</p> <ul style="list-style-type: none"> Able to diagnose and manage complications related to the imaging modality Keeps up to date with advances in use of imaging 	<p>Knows monitoring techniques for radiation exposure Diagnose radiation exposure and knows who to refer to for further action</p>

Expected Levels of Knowledge for Biomechanics and Biomaterials

LEVEL	Descriptor for Knowledge of Biomechanics and Biomaterials	Example: Biomechanics of patella fracture fixation
1	<p>Basic</p> <ul style="list-style-type: none"> • Normal anatomy, physiology of normal tissue • Knows of common materials used in Orthopaedics • Knows the biomechanical properties of normal tissue 	<p>Normal anatomy of patellofemoral joint – including muscles and tendons Materials that make K- and cerclage wires and its properties (bioinert, biocompatibility) Biomechanical properties of bone, tendon and muscle</p>
2	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Knows the biomechanical properties of implants and other biomaterials • Knows the biomechanics of joints, fractures 	<p>Knows the biomechanical principles and techniques of TBW Know the kinematics of the knee joint – in particular, of the patellofemoral joint, extensor mechanism Knows the mechanisms of patella fractures</p>
3	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to apply knowledge of biomechanics and biomaterials to treat simple fractures and injuries • Knows the consequences of deviation from normal 	<p>Able to recognise types of patella fractures suitable for TBW Recognises a poorly applied TBW</p>
4	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to apply knowledge of biomechanics and biomaterials to treat complex fractures and injuries 	<p>Able to recognise that comminuted patella fractures require alternative fixation methods – example cerclage wiring</p>
5	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to identify causes of biomechanical and biomaterial failure post treatment 	<p>Able to identify causes of failure of patella fracture fixation – e.g., inappropriate indication, noncompliance to rehabilitation protocols</p>
6	<p>Advanced</p> <p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to use knowledge of biomechanics and biomaterials to address post-treatment failure 	<p>Uses knowledge of failure mechanisms and normal biomechanics to manage fixation failure – e.g., reconstruction of knee extensor mechanism</p>

Expected Levels of Knowledge for Surgical Principles and Equipment

LEVEL	Descriptor for Knowledge of Surgical Principles and Equipment	Example: Diathermy
1	<p>Basic</p> <ul style="list-style-type: none"> • Knows normal anatomy, physiology and pathology • Knows basic surgical principles and functions of different surgical instruments and equipment 	<p>Knows vascular anatomy Knows coagulation pathways, clotting mechanisms Knows diathermy modules – bipolar vs monopolar, coagulation vs cutting – and how to apply to blood vessels only</p>
2	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to describe the indications, contraindications and precautions of use of surgical instruments/equipment • Able to apply surgical principles and/or use surgical equipment safely under supervision 	<p>Indications to use bipolar (e.g., hand surgery) vs monopolar (e.g., hip surgery) Caution in patients with cardiac pacemaker</p>
3	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to apply surgical principles and/or use surgical equipment safely independently • Knows how to avoid complications of use 	<p>Positioning of patient – avoid touching grounded metal objects Placement of return pad on muscular areas of the body close to operative site Avoid using in vicinity of flammable substances e.g., alcohol skin preparations Not to apply on skin to avoid burn wounds</p>
4	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to recognise common complications related to misuse or errors in use of equipment and instruments and managing with assistance 	<p>Recognises diathermy burn wounds to skin edges, needs assistance and guidance to excise lesion and treat the wound appropriately</p>
5	<p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to supervise and guide juniors on the correct/appropriate use of surgical principles, equipment and instruments. • Knows of and able to use alternatives to conventional devices • Able to independently recognise and treat common complications related to misuse or errors in use of equipment and instruments. 	<p>Use of Gelfoam® to aid in coagulation Recognises diathermy burn wounds to skin edges, able to excise lesion and treat the wound appropriately independently</p>
6	<p>Advanced</p> <p>In addition to the above,</p> <ul style="list-style-type: none"> • Able to recognise and treat serious complications related to misuse or errors in use of equipment and instruments. 	<p>Effect of diathermy on patients with cardiac pacemakers, and treating dysrhythmias or cardiovascular collapse in these patients as a result of diathermy use Recognising and managing major burn wounds due to use of diathermy in wet conditions</p>

Expected Levels of Surgical Knowledge and Skills

Surgical knowledge in this section refers to the knowledge needed to perform a particular procedure. The pre-requisite knowledge of the condition/diagnosis is covered in the previous section (Clinical Knowledge). In certain cases, the condition itself poses surgical challenges. For example, in correction of congenital deformity, it will require some detailed knowledge of that deformity so that the surgeon will know how to plan for and address it during surgery. In the second example of neglected DDH for THR, knowing that the femoral neck is more anteverted than normal and the acetabulum is more shallow than normal, will alert the surgeon to account for these during THR. In both instances, the trainee would come to know of these abnormalities when going through the Applied Clinical Sciences and Clinical Knowledge sections of this Syllabus.

LEVEL	Descriptor for Knowledge of Procedure	Example: Carpal Tunnel Release
1	Basic <ul style="list-style-type: none"> • Normal surgical anatomy, physiology, pathology 	Anatomy of the carpal tunnel and its contents
2	In addition to the above, knows of <ul style="list-style-type: none"> • Principles of the surgery/procedure • The most widely used surgical approach 	Identifying anatomical landmarks and placement of incision Purpose of transverse carpal ligament release
3	In addition to the above, knows of <ul style="list-style-type: none"> • The detailed surgical technique • Important structures to avoid • Knows to apply principles to management of patients • Complications of the procedure/management 	Application of tourniquet and anaesthesia (local and regional) Knows the steps from incision to closure Structures to avoid: median nerve, recurrent branch of median nerve, superficial and deep palmar arches
4	In addition to the above, knows of <ul style="list-style-type: none"> • Alternative surgical approaches/techniques • Variation in local anatomy which may lead to potential difficulties – needs to know when to call for assistance • Ways to avoid and manage complications of the procedure 	Mini-open, Endoscopic techniques Complications: nerve and tendon injury, infection, poor wound healing, haematoma
5	In addition to the above, knows of <ul style="list-style-type: none"> • Recent advances related to surgical procedure • The principles for complex and/or revision procedures 	Knows causes of recurrent CTS Identify the reasons leading to difficult CTR (e.g., scarring around incision site, ESRF with distal AV fistula on the same limb)
6	Advanced In addition to the above, knows of <ul style="list-style-type: none"> • Surgical planning and techniques for complex and/or revision procedures • The evidence for the surgical options and able to decide for or against a procedure tailored to the patient 	Knows of the techniques and able to plan how to overcome scarring and fibrosis when performing CTR (e.g., hypothenar fatpad flap, nerve wrapping technique)

In the table for Descriptor for Skills to Perform A Procedure, the levels range from no prior experience expected (Level 1) to able to manage without assistance or supervision (Level 6). Selected procedures are required as part of the Entry ELA is depicted with the symbol α ; and Exit ELA is depicted by the symbol β .

LEVEL	Descriptor for Skills to Perform Procedure	Example: Carpal Tunnel Release
1	No experience expected	Has observed a CTR
2	Has assisted	Has assisted in CTR
3	Can manage under supervision	Able to carry out parts of the procedure with assistance – skin incision, identifying vital structures Able to come up with a workable postoperative care plan with assistance/supervision
4	Can manage unsupervised but knows when to call for assistance Able to detect common complications.	Able to perform the open CTR independently and unsupervised but knows when to seek help if in difficulty. Able to come up with a workable postoperative care plan without assistance including identifying common complications
5	Able to manage independently including use of alternative surgical approaches and/or techniques. Able to treat common complications.	Able to perform CTR via a mini-incision or endoscopically. Able to manage common complications of CTR – wound breakdown, haematoma
6	Able to manage without assistance including complex/reconstructive surgeries, revisions and its complications	Able to perform revision CTR

8.1 Applied Clinical Sciences

Applied Clinical Sciences

In order to make the most of their training, orthopaedic trainees must have a sound grasp of the basic sciences relevant to Orthopaedics. This section lists levels of progression to be reached at each stage of training, upon entry, during and at the end of training. The legend (α) symbolises an Entry Essential Learning Activity (ELA):

Applied Clinical Sciences	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
ANATOMY			
Must know what is normal, its variance and the clinical relevance			
Embryology and developmental anatomy of the musculoskeletal system	1	2	3
Structure and function of connective tissue: bone, cartilage, muscle and tendon, synovium, ligament, nerve, intervertebral disc	2	3	5
Applied anatomy of the limbs and axial skeleton: bone, muscle and tendon, ligament, vasculature and nerve	2	3	5
Surgical approaches to the limbs and axial skeleton	2	3	5
Applied anatomy of the thorax and abdomen	2	3	3
PHYSIOLOGY			
Must know the normal body response, control and its clinical relevance particularly in disease conditions or trauma			
Cardiovascular system: cardiac cycle, control of blood pressure, myocardial performance, shock, interpretation of ECG, central venous pressure, Valsalva manoeuvre, regulation of coronary blood flow, pulmonary circulation, cardiac muscle	2	3	3
Respiratory system: mechanism of breathing, lung volumes and capacity, compliance, changes in gaseous composition, gaseous exchange, oxygen delivery and transport, central and peripheral control of respiration	2	3	3
Nervous system: Resting membrane potential, action potential, synapse and reflexes, pain transmission, nerve repair, motor and sensory system, autonomic nervous system, spinal shock, hypothalamic thermoregulation	2	3	4
Musculoskeletal system: skeletal and smooth muscle, neuromuscular transmission, gait cycle	2	4	5

Applied Clinical Sciences	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
Endocrine system: Calcium and Vitamin D metabolism, adrenal gland, hypothalamic-pituitary-adrenal axis, regulation of blood glucose level	2	3	3
Blood and haematological system: composition of blood and its components, coagulation pathway, compatibility testing of blood, anaemia	2	3	4
Fluid, electrolyte & acid-base balance: distribution and control of body fluid, osmotic pressure, oncotic pressure, fluid and electrolyte management in the perioperative period, fluid resuscitation, sodium homeostasis, potassium homeostasis, calcium homeostasis	2	3	4
Renal system: physiology of urine formation - glomerular filtration rate, creatinine and renal clearance, endocrine function of the kidney	2	3	3
PATHOLOGY Must know mechanisms of damage or injury, body's response, and the clinical relevance/application particularly in disease conditions or trauma			
Cellular injury and tissue response: inflammation, healing and repair, fat embolism	2	3	4
Fluid and hemodynamic derangements and its management: haemorrhage, haemostasis, thromboembolism, oedema, hyperaemia, congestion, shock, infarction, pulmonary embolism, fluid management in the injured patient (α) and in the perioperative period, fluid resuscitation	3	3	4
Fractures: including healing and its complications <i>NB: These are general expected knowledge levels, but in some clinical regions, the levels may differ according to the condition/diagnosis</i>	3	4	5
Wound healing and management	2	3	5
Muscle, tendon and ligament injury and healing	2	3	4
Nerve injury and regeneration	2	3	4
Musculoskeletal infections: infectious agents including tuberculosis, host barriers to infectious agents,	2	3	5

Applied Clinical Sciences	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
pathogenesis of infectious diseases, diagnosis of infectious diseases, periprosthetic infections			
Benign tumours, tumour-like conditions and malignancies of the musculoskeletal system: carcinogenesis and molecular basis of cancer, characteristics of benign and malignant tumours, biology of tumour growth, clinical features and diagnosis of cancer, staging of cancer, principles of cancer treatment	2	2	4
Congenital and inherited musculoskeletal and neuromuscular disorders: mutations, Mendelian disorders, cytogenetic disorders, congenital anomalies, paediatric disorders, diagnosis of genetic disorders, haemophilia	1	1	4
Degenerative musculoskeletal diseases: bones, cartilage, muscles <i>NB: These are general expected knowledge levels, but in some clinical regions, the levels may differ according to the condition/diagnosis</i>	2	3	4
Endocrine and metabolic bone disorders affecting the musculoskeletal system, nutritional disorders	1	2	4
Haematological disorders involving the musculoskeletal system	1	1	3
Heterotopic ossification	1	2	4
Immune system: hypersensitivity reactions, transplant rejections, autoimmune diseases, immunodeficiency disorders, amyloidosis, immunization	1	2	3
Inflammatory musculoskeletal disorders	2	3	4
Osteochondritides	1	1	3
Osteonecrosis	2	2	4
Perioperative management of the orthopaedic patient – including high risk and immunocompromised patients	2	3	5
Systemic disorders: respiratory failure, renal failure, Acute Respiratory Distress Syndrome (ARDS), Systemic Inflammatory Response Syndrome (SIRS), Multiple Organ	2	3	4

Applied Clinical Sciences	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
Dysfunction Syndrome (MODS), metabolic response to trauma and injury			
PHARMACOLOGY Must know the mechanism of action and pharmacokinetics of drugs commonly used in Orthopaedics			
Antibiotics and antibiotic resistance: therapeutic and prophylaxis, therapeutic levels, minimal inhibitory concentration (MIC)	2	3	4
Corticosteroids	2	3	4
Chemotherapeutic agents	1	1	3
Local anaesthetics: with and without adrenaline	2	3	4
Neuroleptic agents	1	2	3
Nonsteroidal Anti-Inflammatory Drugs (NSAIDs): nonselective NSAIDs, COX2 inhibitors	3	3	5
Opiates and opioids	3	3	4
Others: paracetamol, sedatives, anxiolytics	2	2	4
REHABILITATION Must know common terms and modalities used in rehabilitation of orthopaedic patients. Must know indications and contraindications as well as the strengths and weaknesses of each modality.			
Occupational therapy	2	3	3
Orthotics and Prosthetics	1	2	3
Physiotherapy	2	3	3
OTHER THERAPEUTIC MODALITIES Must be aware of the principle of use, indication, contraindications, strength & weakness of the modality in question. Not expected to know the inner workings of the equipment.			
Hyperbaric therapy	1	1	2
Pain management	2	3	4
Palliative care	1	1	3
Radiotherapy	1	1	2
Regenerative therapy: stem cells, platelet rich plasma (PRP), regenerative agents, tissue engineering	1	1	3
Transfusion of blood products	3	4	4

8.2 Subspecialty Rotation

Clinical Rotations

All Orthopaedic trainees undergo a series of rotations throughout their training. Except for Orthopaedic Oncology, the syllabus for the rotations is set out according to patient age and regions. The tables are categorised in the form of what is required at the start of the rotation, the end of the rotation and at the end of training. In some instances, the level expected at the end of training may be higher than that at the end of the rotation.

Adult Orthopaedics	Knowledge level expected of a trainee at		
	Beginning of rotation	End of rotation	Exit Exam
SPINE			
C1/ C2 subluxation	2	3	4
Cauda equina syndrome	3	4	5
Conus medullaris syndrome	3	4	5
Hangman fracture	2	3	4
Jefferson fracture	2	3	4
Kyphotic deformities – Scheuermann disease, Ankylosing spondylitis	2	3	4
Metabolic disorders affecting the spine – Osteoporosis and others	2	3	4
Myelopathies – cervical and thoracic	2	3	4
Odontoid fracture	2	3	4
Other causes of low back pain – Sacroiliac (SI) joint, Diffuse Idiopathic Skeletal Hyperostosis (DISH), coccydynia and others	2	3	4
Prolapse Intervertebral Disc (PID)	3	4	5
Radiculopathies	2	3	4
Sacral fractures	2	3	4
Scoliosis (Idiopathic, Neuromuscular, Congenital and others)	2	3	4
Spinal cord injury syndromes	3	4	5
Spine infection – Tuberculosis (TB) and pyogenic	3	4	5
Subaxial fractures and dislocations	2	3	4
Thoracolumbar fractures	3	4	5
Tumour – benign and malignant/metastatic	3	4	5
SHOULDER & ELBOW			
Acromioclavicular joint injuries	2	3	4
Adhesive capsulitis (Frozen shoulder)	2	3	5
Calcific tendonitis	1	3	4
Shoulder dislocation and instability	2	3	5
Rotator cuff injuries	2	3	4

Adult Orthopaedics	Knowledge level expected of a trainee at		
	Beginning of rotation	End of rotation	Exit Exam
Scapulo-thoracic dissociation	2	3	4
Shoulder impingement syndrome	2	3	4
Elbow dislocation and instability	2	3	4
Medial and lateral epicondylitis	2	3	5
WRIST & HAND			
Brachial plexus injury	2	3	4
Congenital abnormalities of the upper limb	1	3	3
Dislocation and ligamentous injuries of the upper limb	3	4	5
Fingertip and nailbed injuries	2	4	5
Infections in the hand and upper limb	3	4	5
Inflammatory conditions affecting the hand	3	4	5
Peripheral nerve conditions in the upper limb (injuries, compression and tumours)	2	3	4
Tendinopathies and tendon injuries	3	4	5
Tumours of the hand	2	3	4
Vascular conditions and injuries	2	3	4
PELVIS & HIP			
Pelvic injuries	3	4	4
Acetabulum fracture	3	4	4
Fracture neck of femur	4	5	5
Inflammatory arthropathies	3	4	4
Osteoarthritis	3	4	5
Osteonecrosis of the femoral head	2	4	5
Peri-prosthetic fractures	2	4	4
Peri-prosthetic infections	3	4	5
Femoro-acetabular impingement	1	2	3
Snapping hip	1	2	3
Trochanteric bursitis	1	2	3
KNEE			
Bursitis around the joints of the lower limb	3	4	4
Inflammatory arthropathies	3	4	5
Osteoarthritis	3	4	5
Peri-prosthetic fractures	2	4	4
Peri-prosthetic infections	3	4	5
Articular cartilage defects	2	3	4

Adult Orthopaedics	Knowledge level expected of a trainee at		
	Beginning of rotation	End of rotation	Exit Exam
Avulsion fractures	3	4	5
Ligamentous injuries with/without dislocation	3	4	4
Meniscal injuries	3	4	4
Osgood-Schlatter disease	2	3	4
Patello-femoral disorders	2	3	4
FOOT & ANKLE			
Achilles tendinopathy	2	3	4
Angular deformities	2	3	4
Diabetic limb problems	3	4	5
Dislocations and joint instability	3	4	5
Forefoot deformities	2	4	4
Hallux valgus	2	4	4
Inflammatory arthropathies	3	4	4
In-growing toenail	3	4	5
Lesser toe deformities	2	4	4
Pes planus, pes cavus, congenital talipes equinovarus (CTEV), equinus deformity and other foot deformities	2	4	4
Plantar fasciitis	3	4	5
Syndactyly and polydactyly	2	3	4

Paediatric Orthopaedics	Knowledge level expected of a trainee at		
	Beginning of rotation	End of rotation	Exit Exam
Angular deformities	2	3	4
Arthrogryposis multiplex congenita	2	4	4
Blount's disease	2	4	4
Congenital talipes equinovarus (CTEV)	2	4	5
Constriction band	2	3	4
Development dysplasia of the hip (DDH)	2	4	4
Ehlers-Danlos syndrome	2	4	4
Hand & Foot syndactyly and polydactyly	2	4	4
Klippel-Feil	2	3	3
Lesser toe deformities	2	4	4
Limb length discrepancy	2	4	5
Marfan's syndrome	2	4	4
Neurofibromatosis	2	4	4
Neuromuscular disease	2	4	4
Orthopaedic problems related to cerebral palsy	2	4	4
Orthopaedic problems related to Trisomy 21	2	4	4
Osteogenesis imperfecta	2	4	4
Osteomyelitis	3	4	5
Perthes' disease	2	4	4
Pes planus, pes cavus, equinus deformity and other foot deformities	2	4	4
Proximal femoral focal deficiency (PFFD)	2	4	4
Radial club hand	1	3	4
Short stature	2	4	4
Slipped capital femoral epiphysis (SCFE)	2	4	5
Spina bifida	2	3	4
Tibia / fibula hemimelia	2	4	4

Orthopaedic Oncology	Knowledge level expected of a trainee at		
	Beginning of rotation	End of rotation	Exit Exam
Benign soft tissue tumour	3	4	5
Chondrosarcoma	2	4	4
Ewing sarcoma	2	4	4
Giant cell tumour (GCT)	2	4	4
Haematological malignancies	2	3	4
Malignant soft tissue tumour	2	4	4
Metastatic bone tumour	2	4	4
Neural tumours	2	4	4
Osteoblastoma/ osteoid osteoma	2	4	4
Osteochondroma	3	4	4
Osteosarcoma	2	4	4
Other primary bone tumours	2	3	4
Pathological fractures	3	4	4
Tumour-like conditions of the bone	2	3	4
MULTIDISCIPLINARY TEAM MANAGEMENT			
Adjunct therapy	2	3	3
Chemotherapy	2	3	3
Palliative care	2	3	3
Radiotherapy	2	3	3

8.3 Imaging

IMAGING Must be aware of the principle of use, indication, contraindications, strength & weakness of the modality in question. Not expected to know the inner workings of the equipment.	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
Bone mineral densitometry	2	3	4
Computed Tomography (CT)	1	2	4
Magnetic Resonance Imaging (MRI)	1	2	4
Musculoskeletal ultrasound	1	2	3
Positron Emission Tomography (PET) scan	1	1	2
Radiographs	2	3	5
Nuclear Medicine Scans - bone scan, tagged scans	1	2	4

8.4 Biomechanics and Biomaterials

BIOMECHANICS & BIOMATERIALS	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
Musculoskeletal biomechanics: kinetic and kinematic, biomechanics of musculoskeletal tissues (bone – properties, mechanism of fractures, strain theory on fracture healing; ligament and tendons), biomechanics of natural and artificial joints (spine, hip, knee, hand)	2	3	4
Biological materials: bone, tendon and nerve grafts, bone banking and tissue transplantation, autograft vs allograft vs synthetic	2	3	4
Materials in orthopaedic implants (e.g., metals, polyethylene, polymethylmethacrylate, fibre wire, biodegradable screws etc): characteristics (biocompatibility, bioinert), types of materials, material properties, mechanism of material failure	2	3	4
Biomechanics of fracture fixation: tissue response to implants, plates vs nail, screws, load sharing vs load sparing, Kirschner wires, cerclage wire, tension band principle, lag screw fixation, compression/ buttress/neutralising plate, factors of internal fixation failure, external fixation, biomechanics of Plaster-of-Paris (POP) application	2	3	5
Bearing materials (tribology) of artificial joints	1	2	3

8.5 Surgical Principle and Equipment

SURGICAL PRINCIPLES AND EQUIPMENT Must be aware of the principle of use, indication, contraindications, safety/precautions to be taken when using, advantages/disadvantages and how to manage complications of accidents/misuse of the modality in question. Not expected to know the inner workings of the equipment.	Knowledge level expected of a trainee at		
	Entry (SPOT)	End Year 1	Exit Exam
Principles of safe surgery and clinical practice: universal precautions, surgical precautions, surgical site marking, time out, hand hygiene, surgical site infection prevention, prophylactic antibiotics	3	4	5
Diathermy	2	3	4
Neuro-monitoring	1	1	2
Skin and skeletal traction	2	4	5
Sterilisation	1	2	3
Surgical instruments	2	3	4
Suture and needles	3	4	4
Tourniquet	3	4	4
Vascular Doppler	1	2	3

8.6 Essential Orthopaedic Procedure

Essential Orthopaedic Procedures

Essential Orthopaedic Procedures are those which are considered crucial for surgeons to become skilled in to practice in Malaysia. Trainees must continually improve upon them throughout the entire training programme.

ESSENTIAL ORTHOPAEDIC PROCEDURES	Knowledge level expected of a trainee at					
	Entry (SPOT)		End Year 1		Exit Exam	
	K	S	K	S	K	S
Arthrotomy	2	2	3	2	5	4
Bone grafting – autograft from ASIS and PSIS, allograft	2	2	3	3	5	4
Buttress plating	2	2	3	2	5	4
^α Closed manipulative reduction and application of full-length cast under sedation – upper and lower limbs	3	3	4	4	5	5
^α Early complications following trauma – Review and management of painful swollen extremities post trauma – compartment syndrome, fractures, vascular injury, crush syndrome, fat embolism	3	2	4	3	5	4
Fixation of peri- and intra-articular fractures	2	2	3	2	4	4
^α Fluid management in the injured patient	3	3	4	3	5	4
^α Incision & drainage / Toilet & suturing / debridement	3	3	4	4	5	5
^α Initial assessment of patient with a possible acute musculoskeletal infection	2	2	3	3	5	4
Intramedullary nailing of the tibia and femur	2	2	3	3	5	4
K-wiring techniques	2	2	3	3	4	4
Lag screw fixation	2	2	4	3	5	4
Large joint aspiration and injection	2	2	3	3	5	4
Local anaesthetic use – local blocks – upper and lower limbs	2	2	4	3	5	4
Local anaesthetic use –regional blocks – upper and lower limbs	2	1	3	2	4	3
^β Lower limb amputations – transtibial and transfemoral	2	2	3	3	5	5
Major traumatic amputations and crush injuries	2	1	3	2	4	4
Management of acute dislocations with and without fractures	2	2	3	2	4	4
Management of late fracture complications (general/local) – VTE, mal-union, non-union etc	2	2	3	2	4	3

ESSENTIAL ORTHOPAEDIC PROCEDURES	Knowledge level expected of a trainee at					
	Entry (SPOT)		End Year 1		Exit Exam	
	K	S	K	S	K	S
Management of implant associated infection	2	2	3	2	4	4
Management of neurovascular injuries	2	2	3	2	4	3
Management of open fractures	3	2	4	3	5	4
Management of pelvic injuries – acute	2	2	3	2	4	4
Management of pelvic injuries – definitive	2	2	3	2	4	3
Management of physeal injuries	1	1	2	2	4	4
Management of septic arthritis	2	2	3	2	5	4
Management of the polytrauma patient – ETC, DCO	3	2	3	3	4	4
α Plating of long bone fractures	3	2	4	3	5	4
Sequestrectomy/bone resection in osteomyelitis	1	1	3	3	4	4
α Spinal trauma – Urgent assessment of patient with possible cervical spine injury	2	2	3	2	4	3
Split skin grafting	3	2	3	3	5	4
Tension band wiring – patella, olecranon	2	2	3	3	4	4
Uniaxial external fixation of extremities	3	2	4	3	5	4
Wide Awake Local Anaesthesia No Tourniquet (WALANT)	1	1	2	1	4	3

8.7 Procedures in Subspecialty Rotation

Procedures in Subspecialty Clinical Rotations

All orthopaedic trainees undergo a series of rotations throughout their training (Upper limb, paediatrics, spine etc). The syllabus for these rotations is set out according to regions to accommodate the various combinations of subspecialty coverage in different hospitals (for example: LLRS may be covered by Trauma or Paediatric Orthopaedic units in different hospital settings). The tables are categorised in the form of what is required at the start of the rotation, the end of the rotation and at the end of training. The level expected at the end of training may be higher than that at the end of the rotation signifying continuous upgrading of knowledge and skills throughout the programme.

ADULT ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		Exit Exam	
	K	S	K	S	K	S
SPINE						
<i>Trauma and Emergencies</i>						
Anterior and posterior decompression/ fixation of cervical spine fractures/ dislocations	2	1	3	2	4	2
Anterior and/or posterior decompression/ fixation of thoracolumbar fractures (new)	2	1	4	2	4	2
Closed reduction of cervical facet dislocation (new)	2	1	4	2	4	2
Drainage of intra/paraspinal & retroperitoneal abscess	2	1	4	2	4	2
Posterior decompression ± instrumentation for cauda equina syndrome (new)	2	1	4	2	4	2
Posterior stabilisation ± laminectomy for spinal metastasis (new)	2	1	4	2	4	2
<i>Elective – Cervical</i>						
Application of cervical traction	2	1	4	4	5	4
Application of halovest	2	1	4	4	5	4
Nerve root/ facet joint injection of the cervical spine	1	1	4	2	4	2
Posterior decompression ± instrumentation/fusion for cervical myelopathy (new)	1	1	3	2	4	2
Anterior decompression ± instrumentation/fusion for cervical disc disease causing radiculopathy/myelopathy (new)	1	1	3	2	4	2
<i>Elective – Thoracolumbar, Lumbar-sacral</i>						
Epidural, nerve root and facet joint injection	2	1	4	2	4	2
Posterior decompression lumbosacral spine (medial facetectomy/ fenestration/ laminectomy)	1	1	4	2	4	2
Lumbar discectomy	1	1	4	2	4	2
Posterior instrumentation and fusion	1	1	3	2	4	2
Posterior spinal fusion for scoliosis (new)	1	1	3	2	4	2
Trans-pedicular biopsy	2	1	4	2	4	2
Vertebral body cement augmentation for osteoporotic fractures (including vertebroplasty/kyphoplasty) (new)	1	1	3	2	4	2

ADULT ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		Exit Exam	
	K	S	K	S	K	S
SHOULDER & ELBOW						
<i>Trauma and Emergencies</i>						
Fixation of complex intra-articular fractures of the shoulder and elbow	2	2	3	3	4	2
Fracture fixation of the shoulder, humerus and elbow with or without ligamentous repair – including IM nailing	2	2	3	3	4	4
Treatment of fracture-dislocations of the shoulder and elbow: non-operative	2	2	3	3	5	5
Treatment of fracture-dislocations of the shoulder and elbow: operative	2	2	3	3	4	3
Amputation – fore-quarter, proximal and distal to elbow, disarticulation	2	1	3	2	4	2
<i>Elective</i>						
Arthrodesis of the shoulder and elbow	2	1	3	2	3	2
Arthroscopic-assisted shoulder procedures	2	1	3	2	4	2
Arthroscopy of the shoulder – diagnostic	2	1	3	3	4	3
Manipulation under anaesthesia for shoulder	2	1	2	1	4	3
Primary open repair/reconstruction/stabilisation of Acromioclavicular joint (ACJ)	2	1	3	2	4	2
Primary open stabilisation of Glenohumeral Joint (GHJ)	2	1	3	2	4	2
Release of simple contractures of the elbow	2	1	3	2	4	2
Rotator cuff repair - Open/Mini Open	2	1	3	2	4	2
Shoulder arthroplasty – Hemi, Total and Reverse shoulder arthroplasty	2	1	2	1	4	2
Total elbow arthroplasty	2	1	2	1	4	2
WRIST & HAND						
<i>Trauma and Emergencies</i>						
Amputations of the hand, wrist and forearm	2	1	4	3	4	3
Amputation of the digit(s)	2	1	4	3	5	4
β Fixation of complex intra-articular fractures of the distal radius	3	2	4	3	4	3

ADULT ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		Exit Exam	
	K	S	K	S	K	S
Dislocations: Closed Reduction	3	2	4	3	5	4
Dislocations: Open Reduction	3	2	4	3	4	2
Dislocations: Repair and Reconstruction of ligaments	1	1	3	2	4	2
Drainage of infection in the hand	3	2	4	3	5	4
Fasciotomies of the hand and forearm	2	1	3	3	5	4
Fracture fixation of the hand, wrist and forearm with or without ligamentous repair	3	2	4	4	4	4
Local and regional flaps in the hand	2	1	3	2	4	2
Nerve coaptation	2	1	4	2	4	3
Nerve transfer	2	1	4	2	4	2
Primary and secondary management of fingertip injuries	2	1	4	3	4	4
Tendon repair	2	2	3	3	4	4
Traumatic Amputations: Revascularisation and replantation	2	1	3	2	4	3
Vascular anastomosis	2	1	3	2	4	2
<i>Elective</i>						
Arthroplasty of the hand and wrist	2	1	2	1	3	1
Arthrodesis of the digit(s), hand and wrist	2	1	3	2	4	2
Arthroscopy of the joints in the hand and wrist	2	1	3	1	3	1
Excision of small swellings of the hand, wrist and forearm (<5cm) – benign tumours, lipoma, ganglion, GCT	2	2	4	3	4	4
Nerve reconstruction	2	1	3	2	3	2
Reconstruction of congenital anomalies	1	1	2	2	3	2
Release of compressive neuropathies – median nerve at carpal tunnel	2	2	4	3	4	4
β Release of tendinopathies – trigger finger, DeQuervain tenosynovitis	2	2	4	3	4	4
Tendon reconstruction	2	1	3	2	3	2
Tendon and muscle transfer	2	1	3	2	4	2
Therapeutic injections in the hand and wrist	2	2	3	3	4	4

ADULT ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		Exit Exam	
	K	S	K	S	K	S
PELVIS & HIP						
<i>Trauma and Emergencies</i>						
Amputation – hip disarticulation, hindquarter	2	1	4	1	4	1
β Hip hemiarthroplasty	2	2	4	3	5	3
Advanced intramedullary nailing – e.g., proximal femur, reconstruction, retrograde etc	3	3	4	4	5	4
Treatment of fracture-dislocations of the hip	3	2	4	3	5	3
<i>Elective</i>						
Primary total hip arthroplasty	2	1	4	2	5	2
Proximal femur osteotomy	2	1	2	1	3	2
Salvage procedures for femoral head osteonecrosis	2	1	3	2	4	2
KNEE						
<i>Trauma and Emergencies</i>						
Advanced intramedullary nailing – supracondylar, retrograde	3	3	4	4	5	4
Arthroscopic lavage of septic arthritis of the knee	3	2	4	3	4	3
Disarticulation of the knee	2	1	3	2	4	3
Fixation of ACL or PCL avulsion	3	2	4	3	5	4
β Fixation of complex intra-articular knee fractures	3	2	4	2	5	2
Fixation of fracture-dislocations of the knee	3	2	4	2	5	2
<i>Elective</i>						
β Arthroscopy of the knee – diagnostic with/without debridement for osteoarthritis, plica, synovectomy, removal of loose body, meniscus resection, adhesiolysis	3	2	4	3	4	3
Arthroscopic-assisted procedures of the knee – chondroplasty/ microfracture, meniscal repair, ligament reconstructions	2	1	3	2	4	2
Autograft harvesting/ preparation for ligament reconstruction	2	2	3	3	4	3
Lateral collateral ligament repair/ reconstruction	2	1	3	2	4	2

ADULT ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		Exit Exam	
	K	S	K	S	K	S
Lateral release of patella retinaculum	2	1	3	2	4	3
Medial collateral ligament repair/ reconstruction	2	1	3	2	4	2
Medial patella-femoral ligament reconstruction	2	1	3	2	4	2
Medial plication of patella retinaculum	2	1	3	2	4	3
Patella ligament repair	3	2	4	3	5	4
Primary total knee arthroplasty	2	1	3	2	4	2
Quadriceps tendon repair	3	2	4	3	5	4
Osteotomies around the knee – distal femoral osteotomy, high tibial osteotomy, tibial tuberosity osteotomy	2	1	3	2	3	2
Unicompartmental knee arthroplasty	2	1	3	2	4	2
FOOT & ANKLE						
<i>Trauma and Emergencies</i>						
Amputation: Chopart/ Lisfranc amputation	2	1	3	2	4	3
Amputation: Ray amputation	3	3	5	4	5	4
Diabetic foot: wound debridement	4	3	5	4	5	5
Fasciotomies of the foot	2	2	4	4	4	4
β Fixation of complex intra-articular foot and ankle fractures	2	2	3	2	4	2
Fixation of extra-articular calcaneal, simple talar and other simple tarsal bone fractures	2	2	3	3	4	3
Fixation of fracture-dislocations of the foot and ankle with or without ligament repair	2	1	3	2	4	3
Open repair of tendons of the foot and ankle – including Achilles tendon, acute repair of ligaments and muscles	3	2	4	3	4	4
ORIF for malleolar, metatarsal and phalangeal fractures	3	3	4	4	5	4
Percutaneous repair of Achilles tendon	1	1	2	2	3	2
Resection arthroplasty	2	1	3	2	4	2
<i>Elective</i>						
Achilles tendon lengthening	2	1	3	2	4	3
Ankle arthroscopy – diagnostic, simple therapeutic procedures	2	1	2	2	3	2

ADULT ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		Exit Exam	
	K	S	K	S	K	S
Calcaneoplasty	2	1	3	2	3	2
Hallux valgus surgery	2	1	3	2	4	2
Interphalangeal fusions	2	1	3	3	4	3
Osteotomy of phalangeal	2	1	3	3	4	3
Metatarsophalangeal (MTP) cheilectomy, fusion	2	1	3	2	4	3
Posterior tibial tendon dysfunction (PTTD) reconstruction	1	1	2	2	3	2
Reconstruction of the anterior talofibular ligament	2	1	3	2	3	2
Surgical treatment of ingrowing toenail	2	2	4	4	5	4
Tibiotalar calcaneal fusion	2	1	3	2	3	2
Triple fusion	1	1	3	2	4	2
LLRS						
Periarticular fracture fixation with Ilizarov/hexapod external fixator	1	1	2	2	3	2
Joint arthrodesis with Ilizarov/hexapod external fixator	1	1	2	2	3	2
Angular deformities correction with ilizarov/hexapod external fixator	1	1	2	2	2	2
Acute correction of deformity of long bone using internal fixation	1	1	2	2	2	2
Limb lengthening with Ilizarov/hexapod/monorail external fixator – include corticotomy for distraction osteogenesis and bone transport	1	1	2	2	3	2
Infected non-union fixation with Ilizarov/hexapod/monorail external fixator	1	1	2	2	3	2
Joint contracture correction with Ilizarov/hexapod external fixator	1	1	2	2	2	2

PAEDIATRIC ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		End Year 4 (Exit Exam)	
	K	S	K	S	K	S
Trauma and Emergencies						
Application of external fixator and wound debridement	2	2	4	4	4	4
Arthrotomy for septic arthritis –knee, ankle	2	2	4	4	4	4
Arthrotomy for septic arthritis – hip, shoulder,	2	2	3	3	4	3
Closed manipulative reduction of paediatric fractures and casting	2	3	5	4	5	4
Closed percutaneous and open reduction of radial head and neck fracture	1	1	4	3	4	3
Debridement and sequestrectomy	2	2	4	4	4	4
Hip spica	1	1	4	3	4	3
Open reduction and internal fixation	2	3	5	4	5	4
Open reduction and internal fixation of displaced lateral and medial condyle/intra articular fractures	1	2	4	3	4	3
Open/Close reduction and K-wiring	2	3	4	4	4	4
Reduction and fixation of Monteggia fracture	1	1	4	4	4	4
Slipped upper femoral epiphysis (SUFE) - pinning in-situ	1	1	4	2	4	2
Supracondylar humerus fracture: CMR with or without percutaneous pinning	2	2	4	4	4	4
Titanium elastic nail of tibial, femoral, and forearm fractures	2	1	4	4	4	4
Titanium elastic nail of humerus	2	1	4	2	4	2
Elective						
Amputation (all levels)	2	2	4	3	4	3
Blount's – simple corrective osteotomy in early stage	2	2	4	2	4	2
Cerebral palsy (CP): soft tissue release/transfer	2	2	4	2	4	2
Congenital talipes equinovarus (CTEV): Ponsetti manipulation, casting, and tenotomy	2	2	4	4	5	4
Congenital talipes equinovarus (CTEV): Surgical procedures – Achilles tendon elongation, posterior ankle release	2	2	2	2	2	2

PAEDIATRIC ORTHOPAEDICS Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		End Year 4 (Exit Exam)	
	K	S	K	S	K	S
Congenital pseudoarthrosis tibia (CPT) – resection and reconstruction	2	2	3	2	3	2
Developmental Dysplasia of the Hip (DDH): Application of Pavlik harness	2	2	4	4	4	4
β Developmental Dysplasia of the Hip (DDH): Arthrogram, adductor tenotomy, CMR and hip spica	2	1	4	2	4	2
Developmental Dysplasia of the Hip (DDH) dislocation: Open reduction	2	1	4	2	4	2
Epiphysiodesis/ guided growth	1	1	4	2	4	2
Intramedullary fixation of abnormal bone e.g., osteogenesis imperfecta and rickets	1	1	3	2	3	2
Long bone osteotomy for angular deformity (Cubitus varus, Genu varus/ valgus) – with or without internal or external fixation	1	1	3	3	3	3
Patella mal-alignment/congenital patella dislocation – medial plication and lateral release	1	1	3	2	3	2
Physeal bar resection	1	1	3	2	3	2
Release of trigger finger and thumb	2	1	4	3	4	3
Excision of simple duplicate thumb	2	1	4	2	4	2
Tenotomy – open or percutaneous – curly toe and other deformities	1	1	4	3	4	3
Torticollis soft tissue release	2	1	4	2	4	2
Varus/ valgus +/- derotation osteotomy of proximal femur	2	1	4	2	4	2

ORTHOPAEDIC ONCOLOGY Skills trainees must continually improve upon from the start of the rotation until exiting the programme	Knowledge level expected of a trainee at					
	Beginning of rotation		End of rotation		End Year 4 (Exit Exam)	
	K	S	K	S	K	S
Curettage and bone grafting of small Grade 1 and Grade 2 benign bone tumours	2	2	3	2	4	3
β Excision of small (< 5 cm) soft tissue/bone tumours – benign	4	3	4	4	5	4
Fixation of pathological fracture	3	2	4	3	4	3
Incision (open) biopsy of bone/soft tissue tumours	2	2	4	2	4	2
Tru-cut or core needle biopsy	2	2	3	2	4	2
Wide resection of malignant bone tumour with reconstruction	2	2	4	2	4	2
Wide resection of malignant soft tissue tumour	2	2	4	2	4	2

9.0 List of lecturers in Clinical Specialty Training

i. Arthroplasty:

- Asst Prof. Dr. Muhammad Haidar Nasuruddin
- Prof. Dato' Dr. Ahmad Hafiz Zulkifly (Honorary Lecturer)

ii. Spine

- Dr. Marazuki Hj Perwira (Visiting Specialist)

iii. Hand and Reconstructive

- Prof. Dr. Kamarul Ariffin Khalid

iv. Oncology

- Asst. Prof. Dr. Ahmad Hud Mahfoodz
- Dr. Mohamed Azril Mohamed Amin (Visiting Specialist)

v. Pediatric Orthopaedics

- Assoc. Prof. Dr. Mohd Shukrimi Awang
- Assoc. Prof. Dr. Ardilla Hanim Abdul Razak
- Asst. Prof Dr. Nik Alyani Nik Abdul Adel

vi. Advance Trauma & Limb Reconstruction

- Prof. Dr. Nazri Mohd. Yusof
- Assoc. Prof. Dr. Ahmad Fadzli Sulong

vii. Foot & Ankle Surgery

- Prof. Dr. Aminudin Che Ahmad
- Dr. Muhamad Syafiz Ahmad Ismani

viii. Sports Surgery

- Prof. Dr. Aminudin Che Ahmad
- Asst. Prof. Dr. Khairul Nizam Siron@Baharom
- Dr. Muhammad Wafiuddin Ahmad
- Asst. Prof. Dr. Muhammad Harith Rosdi (Sport Medicine Specialist)

ix. Rehabilitation

- Asst. Prof. Dr. Salmah Anim Abu Hassan (Rehab Physician)
- Asst. Prof. Dr. Nor Shahizan Binti Mohd Redzuan (Rehab Physician)

x. Sport Medicine

- Asst. Prof. Dr. Muhammad Harith Rosdi

xi. General Orthopedic and Trauma

- Prof. Dato' Dr. Ahmad Hafiz Zulkifly (Honorary Lecturer)
- Prof. Dr. Nazri Mohd. Yusof
- Prof. Dr. Aminudin Che Ahmad
- Prof. Dr. Kamarul Ariffin Khalid
- Assoc. Prof. Dr. Mohd Shukrimi Awang
- Assoc. Prof. Dr. Ahmad Fadzli Sulong
- Assoc. Prof. Dr. Ardilla Hanim Abdul Razak
- Assoc. Prof. Dr. Khairul Nizam Siron@Baharom
- Asst. Prof Dr. Nik Alyani Nik Abdul Adel
- Asst. Prof. Dr. Muhammad Haidar Nasruddin
- Asst. Prof. Dr. Ahmad Hud Mahfoodz
- Dr. Muhamad Syafiz Ahmad Ismani
- Dr. Muhammad Wafiuddin Bin Ahmad
- Asst. Prof. Dr. Muhammad Harith Rosdi (Sport Medicine Specialist)
- Asst. Prof. Dr. Salmah Anim Abu Hassan (Rehab Physician)
- Asst. Prof. Dr. Nor Shahizan Binti Mohd Redzuan (Rehab Physician)

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10.0 Suggested Textbooks & References for Orthopaedic Trainees

General Orthopaedics

- Campbell's Operative Orthopaedics – Azar, Canale, Beaty (Comprehensive reference for operative procedures)
- Miller's Review of Orthopaedics – Miller & Thompson (Excellent for quick reviews and exam preparation)
- Lovell and Winter's Pediatric Orthopaedics – Morrissy, Weinstein (Essential for paediatric rotations)

Orthopaedic Trauma

- Rockwood and Green's Fractures in Adults & Children – Bucholz, Heckman (Authoritative text on fracture care)
- AO Principles of Fracture Management – Rüedi, Buckley, Moran (Standard reference for surgical trauma care and fixation)

Spine Surgery

- Weinstein's The Spine – Herkowitz, Garfin, Eismont (Detailed reference for spine disorders and surgery)

Hand & Microsurgery

- Green's Operative Hand Surgery – Wolfe, Hotchkiss (Comprehensive guide for hand surgery)

Arthroscopy and Sports Surgery

- Textbook of Arthroscopy – Johnson (Focused reference for arthroscopic surgery)

Clinical Examination & Decision-Making

- Apley's System of Orthopaedics and Fractures – Solomon, Warwick, Nayagam (Classic textbook for clinical understanding)
- Hoppenfeld's Physical Examination of the Spine and Extremities – Hoppenfeld (Great for examination techniques)

Basic Sciences

- Basic Orthopaedic Sciences: The Stanmore Guide – Manoj Ramachandran (For exam prep and understanding the fundamentals)

Surgical Skills & Techniques

- Surgical Exposures in Orthopaedics: The Anatomic Approach – Hoppenfeld (Reference for surgical approaches)

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