"This prospectus is made under the provisions of the Universities Act, the Postgraduate Institute of Medicine Ordinance, and the General By-Laws No. 1 of 2016 and By-Laws No. 2 of 2016 for Degree of Doctor of Medicine(MD) and Board Certification as a Specialist"

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

Prospectus

MD AND BOARD CERTIFICATION IN SPORT AND EXERCISE MEDICINE

2017

BOM - 12.03.2016 Senate - 10.08.2016 Council - 19.08.2016

BOARD OF STUDY IN SPORTS MEDICINE

Contents

PROSPECTUS FOR MD AND BOARD CERTIFICATION IN SPORT AND EXERCISE MEDICINE

Nomenclature

- Full title: Doctor of Medicine & Board Certification in Sport and Exercise Medicine
- Abbreviated title: MD & BC in SEM
- University: University of Colombo
- Faculty / Institute: Postgraduate Institute of Medicine
- Departments: Board of Study in Sport and Exercise Medicine

1. Background and Justification / Introduction:

1.1. Background:

Sport and Exercise Medicine is a rapidly advancing science, which has gained much recognition worldwide. In Sri Lanka Sport and Exercise Medicine has evolved into a much sought after specialty.

The postgraduate training programme in Sport and Exercise Medicine (SEM) is a speciality specifically formulated to serve two main purposes; promote wellness and prevent the tide of non-communicable diseases which threaten to engulf our community due to a combination of sedentary lifestyles and poor eating habits, and to provide services to sports personnel to maintain their fitness and endurance throughout the professional life, and to enhance their performance in their respective field of sporting.

The SEM physician participates in a variety of activities and has a number of roles spanning primary and secondary care. While the training programme includes obligatory "core" knowledge and skills, the flexibility within the training programme allows the trainee to pursue areas of special interest. SEM physicians will therefore have a variety of areas of special expertise to satisfy the diversity of needs within the community.

The Ministries of Sports and Health have highlighted the need for qualified personnel in sport and exercise medicine (Appendix 1). These stakeholders have proposed to the PGIM, as the sole body with the mandate of providing postgraduate training in medicine, to set up a study programme to cater to this need. Therefore, the graduates of this programme will have ample opportunities in the government sector. On the other hand, with the advancement of many sports in Sri Lanka, the need and enthusiasm of sports teams to obtain the services of highly qualified medical professional is growing. Therefore, opportunities for employment will open up in private sector, e.g. hospitals, sports clinics, national teams, sport associations,

and clubs. The programme will cater to the aspirations of young doctors who wish to pursue their career in sport medicine.

The outcomes and the level and volume of work of the programme are in concordance with the Level 12 of Sri Lanka Qualification Framework.

1.2. Justification:

Sport and Exercise Medicine (SEM) is a speciality specifically formulated to promote wellness and prevent the tide of non-communicable diseases, which threaten to engulf our community due to a combination of sedentary lifestyles and poor eating habits.

Medical conditions such as obesity, diabetes, hyperlipidaemia, osteoporosis, cardiovascular disease and mental Illness can all be at least partially attributed to a sedentary lifestyle. It is well established that sport and exercise have proven therapeutic benefits in preventing and treating these conditions.

SEM physicians will be armed with specialized skill sets needed to promote and prescribe exercise regimes for various sub-populations leading to the provision of maximum health benefit to the population. SEM specialists will also have the skills needed to prevent and treat injuries in athletes. The SEM specialist will also be skilled in the art of enhancing performance in a fair and legal way. To enable this he/she will need to have knowledge of sports injuries and mastery of exercise physiology as well as sport biomechanics. SEM physicians will also have the skill set necessary to detect and prevent drug doping.

To enable this SEM specialist will need a broad skill set unlike any other specialty. They will need core knowledge of medicine, paediatrics, orthopaedics, emergency medicine, rheumatology, rehabilitation medicine, nutrition, neurology, psychology, physiotherapy and a whole host of other inter-related disciplines. They need a firm knowledge of pathogenesis, diagnosis, treatment and prevention of sports injuries as well as knowing aspects of exercise physiology, biomechanics, nutrition, supplementation, psychology and drug doping.

This prospectus provides information on the regulations, objectives, curriculum, and guidelines for the teaching/learning /evaluation process leading to board certification in SEM.

2. Eligibility for entry into training programme:

Prospective applicants must satisfy the following requirements:

a. A medical degree registered with the Sri Lanka Medical Council
b. Satisfactory completion of internship acceptable to the Sri Lanka Medical Council
c. Successful completion of Postgraduate Diploma in Sport and Exercise Medicine offered by the PGIM, University of Colombo.

d. Passing the selection exam detailed below.
e. Complying with any other PGIM general regulations relevant to selection of trainees.

The criteria prescribed in paragraphs a) to d) must have been satisfied by the applicants as at the date of closure of applications.

3. Selection Examination:

3.1. Components of the selection exam:

The structure of the selection examination is given in Table 1 below.

Table 1 – Structure of the selection examination

Method	No.	Time allocation	Relative mark allocation
MCQ			
True /False	20	60 mins	60
Single Best Answer (SBA)	10	20 mins	40
OSCE	10	60 mins	100

The content areas of the MCQ include: Applied anatomy, applied physiology, applied pathology, microbiology, pharmacology, radiology, medicine, paediatrics, surgery, obstetrics & gynaecology.

Each MCQ of the True / False type will have five responses. Each correct response will be awarded +1 mark; each incorrect response will be awarded -1 mark; and if no response is marked, zero. There will be no negative carry over, so that each question will carry a maximum of 5 marks, and minimum of 0.

Each MCQ of the Single Best Answer type will also have 5 responses. Each correct response will be awarded +3 marks; incorrect responses and no responses will be awarded 0.

The subject areas for the OSCE are detailed in Table 2. The duration of each station is six minutes.

Table 2 –Subject areas of the OSCE examination for MD selection Examination

1. Diagnosis and management of sports injuries
2. Sports doctor (e.g. exercise prescription, doping, ethics, etc.)
3. History taking and communication skills
4. General physical examination
5. Emergency medicine

3.2. Requirements to pass the selection exam

The candidate should obtain a minimum of 50% from MCQs to be eligible for the OSCE. Candidates should score more than 50% from the total mark of the OSCE to be qualified for selection. The combined marks for MCQ and OSCE examinations will be considered for the purpose of ranking.

3.3. Number to be selected for training

The available training opportunities will be indicated by the PGIM in the public circular for the SEM MD examination. The number of training slots will be predetermined each year by the Board of Study and approved by the Board of Management in consultation with the Ministry of Health.

4. Programme outcomes

The SEM consultant participates in a variety of activities and has a number of roles spanning primary and specialist care. SEM physicians will have a variety of areas of special expertise to satisfy the diversity of needs within the community. The role of the Consultant in Sport & Exercise Medicine would be to provide leadership for services, administration and research related to sport and exercise medicine: include:

4.1. Clinical competencies

- To provide accurate diagnosis for those individuals with injury or illness who would like to exercise, or for whom exercise would be beneficial, including the general population, at risk populations, e.g. diabetics, those with cardio-vascular disease, the overweight and obese, special groups such as pregnant women, children and older adults, groups in whom physical activity is limited by co-existing musculoskeletal morbidities.
- To provide a high level of clinical expertise and to communicate effectively with clinicians referring patients for a professional opinion.
- To work closely with allied health professionals to ensure that the patient receives the highest level of clinical care at each stage of their treatment process.
- To work within the sporting environment to ensure a safe exercising environment for participants.
- To provide guidance on sports, exercise and relevant medical requirements in special groups, such as service personnel, called upon to undertake vigorous exercise. To do pre-participation evaluations to determine the fitness of individuals for sporting events.
- To provide support to sportsmen and women to assist them in maximising performance (within international rules) by assisting innutrition, supplementation and motivation, assisting in designing training programs, injury prevention programs and surveillances of athletes for signs of injury and overtraining. Maximising performance and preventing injuries by using sports biomechanics and exercise physiology.
- Diagnosing sports injuries, treating and reducing injury time. Deciding on the suitable treatment options both non-surgical and surgical and referring to the

relevant specialities when needed. Monitoring of rehabilitation programs. Minimising the co-morbidity associated with elite sporting participation.

4.2. Public Health commitments

- To be the advocate in promoting physical activity as a lever for healthy living.
- To identify impediments to an active lifestyle and work within a multidisciplinary framework to remove those impediments or minimise their impact.
- To work alongside health and other relevant administrators and service providers in planning and developing exercise opportunities for the general public for health gain.
- To liaise with local authorities, education sector, the voluntary and private sectors to advise on the health aspects of exercise programmes.

4.3. Managerial functions

- To provide a leadership role within the multi-disciplinary team providing clinical management of individuals with sports and exercise related injury or illness.
- To liaise with relevant authorities at all levels for the development and provision of resources to promote increased physical activity for the general population in the interest of improved community health.
- To establish liaison with other agencies such as social services, housing, education, unemployment, voluntary agencies and the private sector, involved in the provision of sports and exercise related services to physically disabled people in the community.

4.4. Education and Research activities

- To participate in regular clinical audit.
- To promote original scientific research to develop and expand the understanding of SEM.
- To critically review scientific literature and apply evidence-based principles to the practice of SEM in the local context.
- To conduct of original research of a quality that makes a significant contribution to development of the discipline and satisfies peer review and merits publication.
- To actively participate in educational activities for children, community groups, sporting organisations, athletes and other medical professionals to promote an active lifestyle and to improve safety standards in sport.
- To participate in approved training programmes in SEM: foundation programmes, basic specialty training and higher specialty training.

4.5. Professionalism

- To promote the highest level of ethical standards within the sporting environment by contribution to sporting organisations and teams.
- To work with and establish courteous and respectful relationships with specialists in other fields such as Medicine, Surgery, Paediatrics, Obstetrics and Gynaecology, General practice, Orthopaedics, Rheumatology, Rehabilitation, Neurology and relevant other specialties.

- To contribute to organisations which promote the dissemination of SEM knowledge throughout the community for the betterment of community health and for the advancement of sport.
- To be an active member of a multi-disciplinary team delivering sport and exercise medicine.
- To take meaningful steps in personal and professional development as a professional complying with concept of lifelong learning.

5. Content areas

- Applied Physiology
- Applied Pharmacology
- Exercise physiology and biomechanics
- General principles of psychology
- Orthopaedics
- General medicine and endocrinology
- Cardiology
- Cardiac electrophysiology
- Neurology and neurosurgery
- Neurophysiology
- Rheumatology and rehabilitation
- Paediatrics
- Accident and emergency, surgical casualty and ICU
- Chest medicine and diving
- Radiology
- Obstetrics and women's health
- Dental, eye and ear
- Sports doctor – Ethics, law and professionalism
- Exercise physiology
- Diving Hyperbaric medicine
- Sports nutrition
- Sports Injuries & Rehabilitation
- Biomechanics and sports analysis
- Public health (NCD prevention)
- Sport and exercise medicine
- Psychology of Sports
- Exercise for health

More details are provided in Annexures 1 – 3.

6. Structure of pre-MD training programme:

The content of the pre-MD programme is organised under four learning strands which run concurrently over a period of 30 months:

- General Clinical Training
- Sport & Exercise Medical Sciences
- Sport and Exercise Medicine in Practice
- Research

Table 3 summarises different modules included under each strand of study of the MD programme and time allocation for modules. The details of modules / rotations are included Annexure 1 (Strand of General Clinical Training) and Annexure 2 (Sport & Exercise Medicine Strand), Annexure 3 (Research Strand).

The PGIM General Regulations for stipulations regarding leave and attendance requirements are applicable.

Table 3– Content and organisation of Pre-MD programme

Year 1	Strand of General Clinical Training (Morning from 8 am - 12 noon)	Rotations	General medicine and endocrinology	Paediatrics	Cardiology and cardiac electrophysiology	Chest medicine		Neurology, Neurosurgery & Neurophysiology		
		Duration (Months)	4	2	1.5	1.5		3		
	Sport & Exercise Medicine Strand (Afternoon from 1 –5 pm)	Modules	Basic and applied sciences	Sports doctor	Exercise physiology Diving Hyperbaric medicine			Sports nutrition		
		Duration (Months)	3	3	3			3		
		Attachment	Sport and exercise medicine in practice (Attachment to a school team)							
Year 2	Strand of General Clinical Training (Morning from 8 am - 12 noon)	Rotations	Rheumatology and rehabilitation	Orthopaedics	Accident and emergency, surgical casualty and ICU	Radiology	Obstetrics and women's health	Psychiatry	STD	Dental, eye and ear
		Duration (Months)	3	3	1.5	1	1	1	0.5	1
	Sport & Exercise Medicine Strand (Afternoon from 1 - 5 pm)	Modules	Sports Injuries & Rehabilitation		Biomechanics and sports analysis					
		Duration (Months)	6		6					
		Attachment	Sport and exercise medicine in practice (Attachment to a school team)							
	Research Strand		Research methodology							
Year 3	Strand of General Clinical Training (Morning from 8 am - 12 noon)	Rotations	Public health (NCD prevention)	Sport and exercise medicine						
		Duration (Months)	3	3						

	Sport & Exercise Medicine Strand (Afternoon from 1 - 5 pm)	Modules	Psychology of Sports	Exercise for health	
		Duration(Months)	3	3	
	Research Strand		Research project		

7. Learning activities during pre-MD training:

The following teaching / learning methods will be used in the course:

- Self-directed learning
- Case-based discussions
- Bedside teaching
- Teaching in other clinical settings, e.g. clinics, theatres
- Journal clubs
- Assignments
- Multi-disciplinary seminars
- Lectures
- Online material
- Regular meetings with other units / department
- Participation in Continuing Professional Development activities
- Participation in national / international meetings
- Conducting an audit
- Conducting a research project.
- Engaging in the teaching and training of undergraduate and postgraduate students
- Maintaining a reflective portfolio

80% attendance for all face-to-face sessions in the afternoon will be mandatory for all trainees. It will be a prerequisite for sitting the MD examination. The structure of case-based discussion, research reports and portfolios will be introduced to trainees at the commencement of the course.

7.1 Research project

A proposal for the research project should be submitted between 12th and 18th months of training. The approval for the research project will be granted by the BoS. The BoS approval for the research proposal is a mandatory requirement for sitting the MD examination (see Annexure 4 for format of project proposal, and Annexure 5 for reviewers to report on research project proposals). The project should be carried out during the pre and /or post MD training.

8. Trainers and training units:

General training in clinical disciplines will be conducted by trainers recognised by the respective boards of studies and by Board of Management. When trainees are assigned to sites belonged to Ministry of Sports or to sports teams, a trainer recognised by respective Board of Study or the Board of Management will be appointed as an off-site trainer.

The training sites include: National Hospital, De Soysa Maternity Hospital, Castle Street Hospital for Women, Lady Ridgeway Children's Hospital, Colombo South Teaching Hospital, Colombo North Teaching Hospital, relevant facilities in Ministry of Sports and sports team located in and around Colombo.

9. Monitoring progress:

The trainees are required to maintain a portfolio and a clinical record book, which will be periodically assessed.

9.1 Pre-MD portfolio

The pre-MD portfolio is used to assess the Strands of General Clinical Training and Sport and Exercise Medicine in Practice. Two portfolio viva voce assessments will be conducted at the end of 12th and 27th months of training. Entries related to the rotations completed will be focused in the viva. Portfolios are graded as 'good', 'satisfactory' and unsatisfactory'. In both instances, a candidate, who does not achieve 'good' or satisfactory' levels, will be directed to complete the unsatisfactory areas in the portfolio within three months of the viva voce. Completion of the portfolio assessment to 'satisfactorily' is a prerequisite to sit for the MD examination. (Tables 5 &6)

TABLE 5 – STRUCTURE OF PRE-MD PORTFOLIO FOR THE STRAND OF GENERAL CLINICAL TRAINING

	Portfolio assessment entries[6]		
	End of 12 months	End of 27 months	
	Case-based discussions with reflection	Case-based discussions with reflection	Project reports with reflection
General medicine and endocrinology	2		
Paediatrics	2		
Cardiology and cardiac electrophysiology	2		
Chest medicine	1		
Neurology, Neurosurgery & Neurophysiology	3		
Rheumatology and rehabilitation		3	
Orthopaedics		3	
Accident and emergency, surgical casualty and ICU		2	
Radiology		1	
Obstetrics and women's health		1	
Psychiatry		1	

STD		1	
Public health (NCD prevention)			1

TABLE 6- STRUCTURE OF THE PRE-MD PORTFOLIO FOR THE STRAND OF SPORT AND EXERCISE MEDICINE IN PRACTICE

	End of 12 months	End of 27 months
	Protocols with reflection	Protocols with reflection
Management and injury prevention	4 cases of sporting injury management 8 exercise prescriptions for two healthy persons, and DM, HT, IHD, Heart Failure, Respiratory disease, Neurological) 2 Anti Doping Tests	4 cases of sporting injury management and exercise prescriptions for two lay persons 3 exercise prescriptions Obesity, Arthritis, Pregnancy 5 Anti Doping Tests

(Cases of injuries must not include similar regions)

10. MD Examination

10.1. Eligibility to sit for MD examination

- 80% attendance for mandatory teaching sessions
- Completion of the pre-MD portfolio satisfactorily (please see below)
- Research proposal accepted by the Board of Study (please see below)

10.2. Structure

The MD examination consists of a written examination (Multiple Choice Questions and Structured Essay Questions) and an OSCE (Table 4). It will be held after 30 months of training.

Each MCQ of the True / False type will have five responses. Each correct response will be awarded +1 mark; each incorrect response will be awarded -1 mark; and if no response is marked, zero. There will be no negative carry over, so that each question will carry a maximum of 5 marks, and minimum of 0.

Each MCQ of the Single Best Answer type will also have 5 responses. Each correct response will be awarded +3 marks; incorrect responses and no responses will be awarded 0.

Table 4– Components and structure of the MD examination

Assessment component			No.	Time allocated	Relative allocation of marks	Total marks	
Written	MCQ	True / False	25	75 minutes	125 (5x25)	200	500
		SBA	15	30 minutes	75 (5x15)		
	SEQ		4	80 minutes	300 (75 x 4)	300	
OSCE			5	100 minutes	500 (100x5)	500	500
							1000

The OSCE will be focused on:

- Clinical examination and assessment
- Consultation and advocacy for sports and exercise
- General medicine and emergency medicine in sports context
- Assessment and management of sports injuries
- Ethics and professionalism

The SEQ paper will be marked by two independent examiners and each OSCE station will be assessed by two examiners independently.

To pass the MD examination, the candidate should obtain 50% in the written examination and 50% in the OSCE.

A maximum of six attempts within a period of eight years from the 1st attempt at the examination are allowed for a candidate to pass the MD Examination, as per General PGIM rules.

11. Post MD training

Post-MD training is two years; one year in Sri Lanka and one year overseas. During local training, the trainees are expected to improve their expertise in relation to the competencies identified in the programme. They will be attached to a local sports unit for a year, the candidates will also be attached to a sports team approved by the Board of Study. In addition, during this period, the candidate will work with a Medical Officer of Health to plan a community exercise programme.

11.1 Post-MD portfolio

Trainees are required to maintain a portfolio which will be assessed as part of the Pre-Board Certification Assessment.

This portfolio should focus on the following areas with documents to support each component.

A. Subject expertise:
   - Progress reports from supervisors of overseas training
   - Supervisor feedback on communication skills
   - Log of procedures carried out in relation to sport and exercise medicine
   - Results of any work-place assessments conducted

B. Teaching
   - Evidence of involvement in public education on exercise
     E.g. brief report on the sessions conducted with background information (topic, targeted audience, time, place, number of participants), and self-reflection (what the trainee did well and what would he/she would have done better.)
   - Evidence of involvement in the education of other healthcare professionals
     E.g. brief report on the sessions conducted with background information (topic, targeted audience, time, place, number of participants), and self-reflection (what the trainee did well and what would he/she would have done better.)

C. Research and Audit relevant to sport and exercise medicine
   - Publication or the research report accepted by the BoS of the research project proposed and accepted by the BoS during the pre-MD period (Mandatory, see section 11.2 below for details)
   - Abstracts presented (Optional)
   - Publications (Optional)

D. Ethics and Medico-legal Issues
   - Completed Professionalism Observation Forms (from integrated learning component of Professionalism Strand)
   - Completed PTR forms during post-MD training

E. Information Technology
   - Participation in training programmes / workshops
     E.g. certificates / letters of participation with an account of what candidate learned by participation in these sessions
   - Guidelines / protocols developed by searching data based

F. Life-long learning
   - Participation in conferences and meetings in Sport and Exercise Medicine

G. Reflective practice
   - Narration of at least one learning event experienced by the trainee, in relation to each of the above outcomes, with reflection on what and how the trainee learned from this experience

The portfolio will be reviewed at least every 6 months by the local supervisor(s), with regular feedback to the trainee on how the portfolio may be improved.

11.2 Research Project

Trainees are expected to complete their research projects during this period, in order to complete the requirements to be considered eligible to apply for the Pre-Board Certification Assessment (PBCA).

Acceptance of the research project by the BOS will be based on fulfilment of either of the following:

(a) Publication of the research findings as an original full paper (not case reports) in a peer-reviewed journal (preferably indexed) with the trainee as first author. No further evaluation is required on the premise that a paper which is already peer-reviewed.

(b) Submission of a detailed project report to the BOS. A generic format for such project reports is shown in Annex 7. This should be evaluated by 2 assessors nominated by the BOS, and marked as either satisfactory, or unsatisfactory.

If the project is considered unsatisfactory by both assessors, the trainee will be requested to revise and resubmit, with written feedback on the required revisions. If the project report is still unsatisfactory, the trainee may, at the discretion of the BOS, be asked to extend the same research project or undertake a new research project which will have to go through the same procedure of approval as the initial project. If there is disagreement between the two assessors, with only one assessor's decision being 'unsatisfactory', the project report should be sent to a third assessor for a final decision.

Presentation of the research findings at a recognized scientific congress, either local or international, as oral or poster presentation, with a published abstract, with the trainee as first author, should be given credit during the assessment process.

During their foreign training, they are expected to bridge gaps in their practical skills in relations to different aspects of sports medicine, and gain new knowledge in the field. The trainees should maintain a separate portfolio during this period as detailed below.

12. Eligibility for Pre Board Certification Assessment:

Conditions to be met by trainees before they can apply for the PBCA.

a. Completion of the required period of training

b. Satisfactory progress reports from supervisors, to cover the entire period of training
c. Submission of a completed portfolio
d. Completion of the research project and acceptance by the BoS

13. Format of PBCA:

When the trainee is eligible for PBCA, 3 copies of the completed portfolio should be submitted to the PGIM Examinations Branch.

The PBCA will take the form of a final, summative assessment of the trainee's portfolio, carried out by 2 independent examiners appointed by the relevant Board of Study or Speciality Board and approved by the Senate of the University of Colombo.

The trainee will be called for an oral examination, during which he/she will be questioned on the portfolio. The trainee will be required to start with a presentation of 15 minutes, on the post-MD training.

The overall assessment will be based on each of the main sections, which should be assessed as satisfactory or not on an overall basis using a rating scale.

If the examiners are of the view that the trainee's performance is unsatisfactory, the trainee will not be given immediate Board Certification, the examiners will provide the trainee with written feedback on how the portfolio should be improved in order to reach the required standard. The trainee should then re-submit the portfolio within a specified period of time (up to 3 – 6 months), and face another oral examination based on the re-submitted portfolio. If the trainee is successful at this 2nd oral examination, the date of Board Certification should be backdated as done routinely. If unsuccessful again, the date of Board Certification will be the date of passing the subsequent PBCA following further training for a minimum period of six months in a unit selected by the Board of Study.

14. Board Certification:

A trainee who has successfully completed the Pre-Board Certification Assessment is eligible for Board Certification as a Specialist in Sport and Exercise Medicine on the recommendation of the Board of Study in Sport and Exercise Medicine."

15. Recommended reading

1) Bartlett R. Introduction to Sports Biomechanics. Illustrated reprint. Manchester: Taylor and Francis: 1997.
2) Brukner P, Khan K. Clinical Sports Medicine. 4th ed. Sydney: McGraw-Hill; 2012.
3) DeLee JC, Drez Jr. D, Miller MD. Orthopaedic Sports Medicine. Principles and Practice. 3rd ed. Philadelphia: Saunders Elsevier; 2010.

4) Hawley J, Burke L. Clinical Sports Nutrition, 3rd ed. Sydney: McGraw Hill; 2006.

5) McArdle WD. Katch FI, Katch VL. Exercise physiology: Energy, nutrition, and humanperformance. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2001.

6) Micheli LJ, Smith AD, Bachl N, Rolf CG, Chan K. F.I.M.S. Team Physician Manual. Hong Kong: Lippincott Williams & Wilkins Asia Ltd; 2007.

16. Contributors to development / revision of prospectus

Annexure 6.

Name	Qualification	Work Place
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ANNEXURE 1: Details of clinical rotations of Strand of General Clinical training:

1.1 GENERAL MEDICINE AND ENDOCRINOLOGY

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management			
				Emergencies	Acute condition(s)	Chronic conditions	Rehabilitation
Cough and breathing difficulties	• AURTI • ALRTI • Asthma • COPD	• CXR • Sputum examⁿ • Lung function testing • CT & MRI	• Exercise testing of lung function and response to bronchodilators • Polysomnography	• Upper airway obstruction • Acute Severe Asthma • COPD	• Asthma • Tonsilitis • Laryngitis • LRTIs	• Asthma • Bronchiectasis • TB • OSA	• Asthma prophylaxis • Physiotherapy • Breathing exercises
Oedema	• CRF • Liver failure • Cardiac • Respiratory	• USS of abdomen • Lung function • Hep B, Hep C	• Renal biopsy • Liver biopsy	• ARF • Hepatic encephalopathy	• ARF • Haematemesis	• CRF • Cirrhosis	• Following surgery
Dyspnoea and chest pain	• IHD • Acquired Heart Disease	• CXR, ECG • 2D Echo and flow studies • Exercise ECG	• Cardiac catheterisation • Contrast imaging	• Cardiac failure • Dysrrhythmias	• Cardiac failure	• Cardiac failure	• Following surgery
LoW with good appetite	• Diabetes • Thyrotoxicosis	• FBS • HbA1c • TSH,T3	• Monofilament test • Fundocopy	• Hypoglycaemia • Hyperglycaemia • Thyrotoxicosis	• Hypoglycaemia • HONK • DKA	• Chronic diabetes	• Dietary management • Psychological management

1.2 PAEDIATRICS

Core clinical problems and related learning events for the Paediatrics rotation

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management			
				Emergencies	Acute condition(s)	Chronic conditions	Rehabilitation
Cough and breathing difficulties	• AURTI • ALRTI • Asthma • Esoteric conditions	• CXR • Sputum exam^{n} • Lung function testing • CT & MRI	• Exercise testing of lung function and response to bronchodilators • Induced cough • Polysomnography	• Upper airway obstruction • Acute Severe Asthma	• Asthma • Tonsilitis • Laryngitis • LRTIs	• Asthma • Bronchiectasis • TB • OSA	• Asthma prophylaxis • Physiotherapy • Breathing exercises
Dyspnoea and chest pain	• Congenital Heart Disease • Acquired Heart Disease	• CXR, ECG • 2D Echo and flow studies • Exercise ECG	• Cardiac catheterisation • Contrast imaging	• Cardiac failure • Dysrrhythmias	•Cardiac failure	• Cardiac failure	• Following surgery
Failure to grow and thrive Eating Disorders	• Physiological aberrations • Nutritional disorders • Psychological disorders	• Imaging • Special tests for assessment of nutritional status including blood levels	• Anthropometry • Growth charts	• Starvation problems	• Acute malnutrition	• Chronic malnutrition including obesity	• Dietary management • Psychological management
Vomiting, Diarrhoea, abdominal pain and jaundice	• GI problems and unrelated causes • Malabsorption • AGE • Surgical causes	• Electrolytes • Blood counts, CRP, Procalcitonin • Imaging	• Contrast imaging • Renal functions • Liver functions	• Acute dehydration • Major electrolyte disturbances	• Dehydration • Starvation • Electrolyte disturbances	• Chronic diarrhoea	• Dietary management on recovery
Headache, visual problems, weakness of limbs, behaviour disorders	• Electrolyte disturbances • Psychological disorders	• CSF • Imaging • Electrophysiology • Genetic studies	• Lumbar puncture • Nerve biopsies • Muscle biopsies	• Coma • Extensive paralysis • Psychiatric states	• Meningitis • Encephalitis • Guillen Barre Sy • Acute flaccid paralysis • Brain tumours • Psychiatric states	• Paresis and paralysis • Psychiatric states	• Physiotherapy • Psychiatric rehabilitation

Joint pains, joint swellings, locked joints muscle pains, muscle weakness, bone disorders	•All arthropathies •Muscular disorders •Systemic disorders	• Blood investigations • Electromyography • Nerve conduction • Imaging	• Arthroscopy • Bone scans	• Acute haemarthrosis	• Autearthropathies • Systemic disorders	• Chronic arthropathies	• Physical therapies and physiotherapy
Dysuria, urine flow problems and unexplained anaemia	• UTI • Urinary tract obstructions • Renal failure	• Blood counts • Urine tests • Renal function tests • GFR • Imaging	• Renal biopsy • Catheterisation	• Urinary obstruction • Cardiac failure due to anaemia	• Septicaemia • Acute renal failure	• Chronic renal failure	• Dialysis • Transplantation
Masses, lumps, unexplained pallor,	• Leukaemia • Lymphoma • Tumours	• Blood tests • Bone marrow • Imaging	• Biopsies • Surgery • Radiotherapy • Chemotherapy	• Cardiac failure due to pallor	• Obstructions • Bleeding • Infections	• Directly related to the diseases	• Post-surgical • Post-radiotherapy • Post-chemotherapy
Abnormal appearance	• Syndromes • Deformities	• Genetic testing	• Bio-Mechanical assessments	• Related medical emergencies	• Related to underlying pathologies	• Endocrinological disorders	• Replacement therapy
Mental and physical disabilities	• All types of mental and physical disabilities	• Imaging	• Genetic testing • Bio-Mechanical assessments.	• Acute trauma due to lack of balance • Acute mental states	• All types of acute psychiatric conditions	• Osteo-arthrosesobilisation aids, callipers, prostheses	•All types of physiotherapy and other ancillary procedures •Use of orthoptic devices. Mobilisation aids and prostheses

1.3 CARDIOLOGY AND CARDIAC ELECTROPHYSIOLOGY

Core clinical problem / presentation	Differential diagnosis	Related investigations	Theoretical aspects	Related management			
				Emergencies	Acute condition(s)	Chronic conditions	Rehabilitation
Key for level of competence	1. History taking 2. Physical examination	Level of competence: 1. Making a referral / request 2. Observation 3. Performance 4. Interpretation	Level of competence: 1. Application of theory	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management
Prevention of Sudden Cardiac Death (SCD)	Identifying at risk individuals	• ECG[1,2,3,4] Differentiating ECG changes due to sports training from pathological changes Identify at risk individuals for SCD- Brugada, Long QT, short QT, ARVD • Echocardiogram [1,2,3,4] Identify cardiac conditions such HOCM, dilated LV and RV, LV function, LVH, MVP, mitral and aortic stenosis, dissection of aorta, aortic diameters in Marfans. • Exercise	Cardiac anatomy and physiology- basic understanding of cellular and gross cardiac structure including chambers and valves, coronary circulation, conduction system of the heart, cardiac markers and changes, basic introduction to congenital heart disease, physiology of exercise. Guidelines- cardiac conditions causing SCD in athletes and	BLS CPR ALS including defibrillation and medications	-	-	-
Identifying Cardio-vascular risk factors	• Hypertension • Hyperlipidemia			-	Management	Management	Management
Chest pain Palpitations Dyspnoea Syncopy	• Ischaemic heart diseases • Arrhythmias • Valvular heart diseases • Pulmonary hypertension • Cardiomyopathy • Congenital heart disease			BLS CPR ALS including defibrillation and medications	Initial management and referral / Management	Initial management and referral / Management	Initial management and referral / Management

		ECG[1,2,3,4] Calculating METS, VO2 max • Exercise treadmill ECG test (ETT) [1,2,3,4] • Haematological tests	Bethesda 36 guidelines and European Society of Cardiology (ESC) 2005 guidelines on sports prescribing for at risk individuals, knowledge of ongoing research, debates and guideline updates on sports cardiology. Pharmacology- Effects of medicine and drug abuse on cardiac function, prescribing drugs with cardiac effects, anti-doping guidelines on cardiovascular drugs.				

1.4 CHEST MEDICINE

Core Clinical Problem /Presentation	Differential Diagnosis Clinical Examination	Related Investigations	Management of Stable diseases Pharmacological Non-Pharmacological	Management of Emergencies
History Taking and assessment of respiratory system	**Respiratory System Examination**	**Basic Investigations Interpretation of** • Chest Radiographs • Peak Flow Recordings • Spirometry Tests		

Asthma Exercise Induced Asthma Exercise Induced Bronchoconstriction Basic principles of exercise in an asthmatic Asthma and high intensity sports Asthma and out-door training / environmental triggers Altitude training in asthmatic athlete Diving and asthma Asthma and the Smoking athlete Asthma triggers and cross-reactivity Assessing for asthma co-morbidities – rhiniosinusitis , gastro-esophageal reflux(GERD), Vocal Cord Dysfunction(VCD)	Differential Diagnosis Exercise Induced Broncho-constriction Exercise induced Vocal Cord Dysfunction Exercise Induced Laryngeao-phryngeal Spams COPD Interstial Lung Disease(ILD) Cardiac Causes Mitral Stenosis and valvular heart diseases Congenital Heart Disease Cardiomyopthies	Use of Peak Expiratory Flow Meter (PEFM) Reversibility and Variability Self-monitoring of asthma Lung Function tests Uses and interpretation Lung Volumes Diffusion studies Bronchial Challenge tests Direct and indirect Challenge tests Exercise challenge tests Eucapneic hyperventilation test Exhaled Breath Nitric Oxide (FeNO) Allergen Assessment Skin Prick Test IgE assays RAST and Immunocap assessment of IgE	Pharmacological managements per International Guidelines GINA (Global Initiative of Asthma) Self –Management Plans Self Monitoring / Assessment Tools (ACT) score Inhaler devices Techniques of use Inhaled Medication Nebulizers and Use Non-Pharmachological management Allergen and Trigger Avoidance Principles of performing physical activity in asthmatics Smoking Cessation Asthma medication and legal implications in athletes TheraputicExcemtion Forms and prohibited asthma medication	As per International National Guidelines First Aid measures Use of rescue medication
Assessment of the Sub-optimally performing Athlete	Clinical History Taking	As relevant and Cardio-Pulmonary Exercise testing		
Exercise Induced Hyperventilation Syndromes				

Exercise Induced Larngeopharngeal Spasm Exercise Induced Vocal Cord Dysfunction				
COPD	Clinical History Taking and differential Diagnosis	Spirometry / Lung Function Tests Diagnosis as per International Guidelines Imaging in COPD Chest Radiographs High Resolution CT Scans 6 min walk Test	Pharmachological management as per International Guidelines Principals of Pulmonary Rehabilitation Smoking Cessation Assessment Tools COPD assessment Test (CAT) Long Term Oxygen Therapy (LTOT)	As per International Guidelines (GOLD)
Pneumothorax	Clinical diagnosis and differential diagnosis	Imaging Chest Radiograph HRCT	Surgical Management Intercostal Tubes Role of Video-Assisted Thorcoscopy (VATS)	Emergency management of Tension pneumothorax
Pulmonary Embolism	Clinical Diagnosis and Differential diagnosis Risk Assessment Score	Imaging Chest Radiograph CT Pulmonary Angiograms VQ scans Trans-thoracic Echo D-dimer Lower Limb Doppler	As per international Guidelines	
Hemoptysis	Clinical Diagnosis and Differential diagnosis	Investigations as relevant		
Respiratory Failure	Clinical Diagnosis and Differential diagnosis	As relevant		
Respiratory Tract Infections	Clinical Diagnosis and Differential diagnosis	As per International Guidelines	As Per National guidelines	As Per National guidelines

Upper Respiratory Tract Infections • Lower Respiratory Tract Infections • Tuberculosis • Lung involvement in HIV				
Drug /substance abuse and lung involvement				
Obstructive Sleep Apnea (OSA)	Clinical Diagnosis and Differential diagnosis Assessment Tools			
Lung Cancer	Clinical Diagnosis and Differential diagnosis	Imaging Chest Radiograph CT Diagnostic Tools Bronchoscopy CT guided biopsy		
Respiratory Diseases of the Aging Athlete • COPD • Late On Set Asthma • Interstial Lung Disease • Lung Cancer • Obstructive Sleep Apnea (OSA) • Tuberculosis • Chronic Respiratory Failure				
Role of the Sports Physician in Pulmonary Rehabilitation in specific Disease States • COPD • Intestinal Lung Disease • End-stage lung disease				
Vaccination for respiratory tract infections				
Diving and Related Problems				

High Altitude Training and Respiratory Patho-physiology				

1.5 NEUROLOGY, NEUROSURGERY & NEUROPHYSIOLOGY

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management			
				Emergencies	Acute condition(s)	Chronic conditions	Rehabilitation
Head injury	Concussion/ TBI Cerebral contusion /SDH/ EDH/ Intracerebral bleed/ SAH Diffuse axonal injury Penetrating injury	X-rays CT scan MRI scan	Assessment Cervical stabilization	Head injury with reduced level of consciousness Head injury with focal neurological deficit Head injury with neck stiffness	Persistent headache	Post concussive syndrome	
Neck injury / Neck pain	Spinal cord injury / compression Radiculopathy Vertebral fractures (stable / unstable) Fractures of spinous or transverse process	X-rays CT scan MRI scan	Assessment Cervical stabilization	Neck injury with limb weakness / sensory or sphincter disturbance	Neck injury with pain	Chronic neck pain	Education and rehabilitation
Lower back injury / back ache	Cauda equina injury / compression Radiculopathy Vertebral	X-rays CT scan MRI scan	Assessment Lumbar stabilization	Lower back injury with limb weakness / sensory or sphincter disturbance	Lower back injury with pain	Chronic backache	Education and rehabilitation

	fractures (stable / unstable)						
Nerve or plexus injury	Peripheral nerve injury CRPS	NCS / EMG US scan CT MRI	Assessment stabilization				Education and rehabilitation
Non traumatic peripheral nerve / root lesions	Entrapment neuropathies Neuropathies due to repetitive minor trauma TOS Radiculopathies	NCS / EMG US scan CT MRI					
Dizzy / vertigo	Vestibular (Peripheral / central) Other	PTA BSER CT MRI	Hall-pikes test and Epley's manoeuvre				
Headache	Post traumatic Exertional Migraine	CT scan MRI scan	Assessment Fundoscopy	Sudden onset severe headache	Headache with sinister features		
Seizure / non traumatic impairment of consciousness	Epilepsy Post traumatic epilepsy concussive convulsions	EEG CT scan MRI scan	Assessment First aid at the site	Seizure on the field	Seizure following head injury	Person with epilepsy	Education and rehabilitation

Sudden onset focal neurological deficit (TIA / Stroke)	Young stroke Carotid / vertebral dissection Substance abuse related ICH / SAH	CT scan MRI scan Duplex neck Cardiac assessment Blood tests	Assessment First aid at the site Using a Glucometer to assess blood glucose level	Stroke/ TIA on the field	Stroke following head / neck injury	Person with stroke Person with aneurysm / vascular malformation	Education and rehabilitation

1.6 RHEUMATOLOGY AND REHABILITATION

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures		Related management		
					Acute condition(s)	Chronic conditions/complications	Rehabilitation
Key for level of competence	History taking Physical examination Disease mechanisms Complications	Level of competence: 1. Making a referral / request 2. Observation 3. Performance 4. Interpretation	Level of competence: 1. Making a referral/ request 2. Observation 3. Performance		Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management
Neck pain	• Mechanical • Inflammatory	• Haematological • X-Rays • MRI			Rheumatological / Neurosurgical management	Rheumatological / Neurosurgical management	Physiotherapy
Shoulder pain Acromio-clavicular Sterno-clavicular	• Articular Infection Inflammatory mechanical • Extra-articular	• Haematological • Ultra Sound Scan • X-ray • MRI	Shoulder aspiration		Rheumatological management	• Rheumatological /Orthopaedic management • Articular and extra-articular injections	Physiotherapy

Elbow pain	• Articular Infection Inflammatory mechanical • Extra-articular	• X-Rays			Rheumatological management	• Rheumatological /Orthopaedic management • Articular and extra-articular injections	Physiotherapy
Wrist and Hand	• Articular Infection Inflammatory mechanical • Extra-articular	•X-Rays			Rheumatological management	• Orthopaedic / rheumatological management • Injections	Physiotherapy Occupational therapy
Thoracic pain	• sternal • sterno-condral joints • Costo-condral joints • Intercostal pain				Rheumatological management	Rheumatologic al management	Physiothe rapy
Back pain	• Mechanical • Inflammatory	•X-Rays Haematology CT/ CT myelogram •MRI			• Rheumatological management	Rheumatologic al / Neurosurgical management	Physiotherapy
Hip pain	• Articular Infection Inflammatory mechanical • Extra-articular	• X-Rays •Haematological investigations • MRI			• Rheumatological management	• Orthopaedic / rheumatological management • Injections	Physiothe rapy
Knee pain	• • Articular Infection Inflammatory mechanical Extra-articular	X-Rays •Haematological investigations • • MRI	Knee aspiration		• Rheumatological management	• Rheumatological /Orthopaedic management • Injections	Physiothe rapy
Ankle Joint	• • Articular Infection Inflammatory mechanical Extra-articular	X-Rays •Haematological investigations • MRI		•	Rheumatological management	• Rheumatological /Orthopaedic management • Injections	Physiotherapy

Foot pain	• Articular Infection Inflammatory mechanical Extra-articular	X-Rays •Haematological investigations • MRI			• Rheumatological management	• Orthopaedic / rheumatological management • Injections	Physiotherapy Orthotics

1.7 ORTHOPAEDICS

Table 6 – Core clinical problems and related learning events for Orthopaedics rotation

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management			
				Emergencies	Acute condition(s)	Chronic conditions/complications	Rehabilitation
Key for level of competence	History taking Physical examination Disease mechanisms Complications	Level of competence: 1. Making a referral / request 2. Observation 3. Performance 4. Interpretation	Level of competence: 1. Making a referral/ request 2. Observation 3. Performance	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management
Acute shoulder injuries	• Fractures ➢ Clavicle ➢ Neck of the Humerus ➢ Scapula ➢ Shaft of the Humerous • Gleno-Humeral Dislocation • AC joint dislocation • Sterno Clavicular Dislocation • Gleno-Humeral Subluxation • Acute muscle/tendon Disruption	• X-Rays[1, 4] • CT[1, 4] • MRI[1, 4]		• Application of triangular bandage in the acute stage[3]	• Application of definitive splint/bandage[3]		Return to play
Non-acute shoulder injuries	• Rotation Cuff Impingement • Swimmers Shoulder	• Ultra Sound Scan[1, 4] • MRI[1, 4]			• Application of various splints[3] • Injection of	• Orthopaedic / rheumatological management[1]	

	• Minor Instability/SLAP Lesion Neurological Problems • Vascular Problems				shoulder joint [3]		
Acute Elbow injuries	• Elbow Dislocation • Distal Humeral Fracture • Radial head/neck Fracture • Separation of medial epicondylar epiphysis • Olecranon Fracture • Rupture of distal biceps	• X-Rays[1, 4] • CT[1, 4] • MRI[1, 4]		• Application of splint/ triangular bandage[3]	• Application of definitive splint[2]		Return to play
Non-acute Elbow injuries	• Lateral Epicondylitis • Osteo chondral Dissicanes • Chronic medial instability • Olecranon Bursitis	•X-Rays[1, 4] •MRI[1,4]			• Application of various splints[3] • Injection of shoulder joint [3]	• Orthopaedic / rheumatological management[1]	Return to play
Acute forearm injuries	• Fracture of Radius and Ulna • Fracture radius with dislocation of inferior radio-ulna joint • Fracture ulna with dislocation of superior radio-ulna joint	• X-Rays[1, 4]			•Application of splint/POP slab •Orthopaedic / rheumatological management[1]		
Acute wrist injuries	• Distal radial fracture • Traumatic carpal Dislocation • Scaphoid Fracture • Scapho-Lunate Dislocation	•X-Rays[1, 4] •MRI[1,4]		• Application of temporary splint[3]	• Application of definitive plaster cast[3]		Return to play
Non-acute wrist injuries	• Carpel Tunnel Syndrome	•X-Rays[1, 4] •MRI[1,4]			• Injecting painful wrist	• Orthopaedic / rheumatological	

	• De Quervain's Tenosynovitis • Triangular Fibro Cartilage Complex Injury • Avascular Necrosis of Lunate • Rheumatoid Arthritis • Chronic Infections				conditions[3] • Application of splints[3]	management[1]	
Hand and Fingers	•Hand Laceration •Metacarpal Fractures •Benelt Fracture •Ulna collateral ligament injury of the thumb •Phalangeal fracture and Dislocation •Mallot Finger •Jersey Finger	• X-Rays[1, 4]		• Application of temporary splint[3]	• Reduction of dislocation and fractures[3] • Application of definitive plaster cast[3]		
Acute back injury	•Strains and Sprains •Acute Disc Prolapse/Strain •Spinal Vertebral Fractures			• Handling a patient with a spinal injury • Transporting a patient with a spinal injury			Return to play
Chronic back injury	• Disc Lesions • Spondylosis • Spondylohisthesis • Lumbar Stenosis • Lumbar Instability • Sacroilitis • Others	X-Rays[1, 4] •Haematological investigations[1, 4] • MRI[1, 4]			• Application of appropriate splints	• Orthopaedic / rheumatological management[1]	
Acute hip pain	• Strains • Iliac Crest Contusion (Hip pointer) • Avulsions	• Ultra Sound Scan[1, 4] • X-Rays[1, 4] • Other					
Non-acute hip pain	• Osteitis Pubis • Sacro- Ilitis	• X-Rays[1, 4] • Ultra Sound Scan[1, 4]			•Injecting painful hip conditions[3]	• Orthopaedic / rheumatological	

	• Snapping Hip • Femero-acetabular Impingement • Hamstring Strain • Stress Fractures • Perthes • SUFE- Shipped Upper Femoral Epiphysis • Transient Synovitis • Tumours • Avascular Necrosis • Osteoarthritis • Chronic Infections • Arthritis	• MRI[1, 4]			•Application of splints[3]	management[1]	
Acute knee injuries	• Anterior Cruciate Ligament Injury • Medial collateral ligament injury • Meniscal Injury • Osteochodral/Chondral Fractures • Patella Dislocation • Rupture of Quadriceps tendon/muscle • Muscular Contusion • Fractures round the knee • Patella Fracture	• X-Rays[1, 4] • Ultra Sound Scan[1, 4] • MRI[1, 4]		• Application of splint and plaster cast[3]			
Acute knee pain	• Anterior knee pain • Recurrent Patella Instability • Jumper's Knee (Patella Tendon Injury) • Osteochodral/Chondral Fractures • Osfood-Schlalter Disease	• X-Rays[1, 4] • Ultra Sound Scan[1, 4] • MRI[1, 4]		• Injection of painful condition round the knee • Injecting PRP			

	• Runner's Knee (IT band syndrome) • Pre Patella Bursitis • Osteo-ChondarlDissecanes (OCD) • Popliteal Tenosynovitis • Osteoarthritis • Synovitis/ Reactive synovitis • Meniscal Injury • Chronic ACL Injury						
Acute lower leg	• Fracture of tibia • Fracture of fibula			• Application of a plaster cast[3]			
Non-acute lower leg	• Stress Fractures • Posterio-medial Stress Syndrome • Extertional Compartment Syndrome • Posterior Tibial Tendinitis • Peronial Tendinitis • Anterior tibial, Extension digitorum, Hallux longus tendinitis • Infections • Tumours • Metabolic Bone Disease	•X-Rays[1, 4] •Haematological inventigations[1, 4] • MRI[1, 4]			• Prescription of appropriate orthotics[3] • Injection for tendinitis[3]	•Orthopaedic / rheumatological management[1]	
Acute ankle injury	• Fractures/ Dislocation • Lateral Ligament Injury • Deltoid Ligament Injury • Tibio-Fibular Syndestrosis Injury	• X-Rays[1, 4] • MRI[1, 4]		• Application of temporary splints[3]			

	• Achillis Tendon Rupture						
Chronic ankle injury	• Insertional Achillis Tendon • Non-insertional Achillis Tendon • Chronic Lateral Ligament Injury • Tibialis Posterior Tendinitis • OCD of Talus • Arthritis of ankle	• X-Rays[1, 4] • MRI[1, 4]			• Application of splints[3] • Injection of painful conditions[3]	•Orthopaedic / rheumatological management[1]	
Acute foot injury	• Metatarsal Fractures • Tarso-metatarsal Dislocation • Mid tarsal joint Injuries • First metatarsal/ phalangeal Joint Injury (Turf toe)	•X-Rays[1, 4]		• Application of splints[3]			
Chronic foot injury	• Hallux Rigidus • Sesamoid Dysfunction • Stress Fractures • Plantar Fasitis • Mid tarsal joint injury	• X-Rays[1, 4] • MRI[1, 4]			• Application of splints • Injection of painful spots	• Orthopaedic / rheumatological management[1]	

1.8 ACCIDENT AND EMERGENCY, SURGICAL CASUALTY AND ICU

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management			
				Emergencies	Acute condition(s)	Chronic conditions/complications	Rehabilitation
Seriously Injured Patient		• Cervical Spine- Lateral • Chest AP • Pelvic AP		• Life threatening Injuries. • Air way Maintainance and cervical spine control • Breathing and ventilation. • Circulation and Hemorrhage control • Disability and Neurological assessment • Exposure.	Secondary Survey.		
Head Injury	• Extradural Hemorrhage • Acute Subdural Hemorrhage • Sub Arachnoid Hemorrhage • Chronic Subdural Hemorrhage • Cerebral Contusion	• X-ray Skull • CT Scan • MRIScan			•Glasgow coma scale		
Neck and Spinal injuries	• Cervical Injury • Thoracic spine Injury • Thoracolumbar Spine Injury • Lumbar Spine Injury	• X-Ray Spine • CTSpine • MRISpine	Neurological Examination	• Cervical Spine Control and Stabilization • Spinal Log roll			

Trauma to Face and Mouth	• Orbital Fracture • Mandibular Fracture • Soft tissue Injury • Intra Oral Injury	•X-Rays •CT Scan		Semi prone Position.			
Thoracic Injury	• Tension Pneumothorax • Open Pneumothorax • Massive Haemothorax • Flail Chest • Pericardial Tamponede • Diaphragmatic Injury	• X-RaysChest • CT Scan		Insertion Of Intercostal Tube			
Abdominal Injury	• Liver • Spleen • Pancreases • Stomach • Duodenum • Small Bowel • Colon • Renal and Urological	•Ultra Sound Scan •CT Scan Diagnostic Peritoneal Lavage		• Damage Control Surgery			

1.9 RADIOLOGY

	Level of competence
Knowledge of theoretical underpinning	Identify normal radiological anatomy of the skull, spine, bones and joints and the related soft tissues
	common indications for plain radiograph, CT and MRI for different bones and joints
	Identify the availability of the radiological modalities in different centers
	Identify the modality of choice for the best and least expensive evaluation of a disease process in an anatomical site and alternative imaging modalities
	Radiological and technical steps for doing plain X Rays, US,CT, MRI, Nuclear imaging
	Discuss the indications and procedural steps for performing special radiological investigations, like arthrograms, guided injections, dynamic assessment studies and other procedures
	Develop a viewing pattern that answers the clinical questions and presents relevant findings
	common pathologic entities and provide a diagnosis or a differential diagnosis for one or a combination of radiologic findings
Interpretative skills	Discuss radiological reporting of skeletal trauma. Report the proper plain x ray/CT/MRI description of fractures, position and alignments radiologically
	Discuss radiological reporting of soft tissue trauma. Report the proper plain x ray US/CT/MRI description of soft tissue injuries, head injuries, spinal injuries
	Evaluate radiological signs of osteomyelitis and septic joint, spondylodiscitis, tuberculosis, sarcoid and Paget's disease
	Review the differential diagnoses for chondrocalcinosis, bone infarcts, epiphyseal, metaphyseal and diaphyseal lesions of bone
	Recognize different bone matrices such as osteoid, fibrous and chondroid matrices, different type of muscles, soft tissues, fat etc and their different radiological appearance in different radiological modalities
	Discuss the differential diagnosis of common soft tissue and muscle lesions and understand the origin of different appearance in US, CT and MRI imaging
	Discuss the differential diagnosis of common osteolytic and osteosclerotic lesions of bone and understand the origin of metastasis from other organ systems to bone
	Evaluate differential diagnosis of expansile bone lesions, permeative lesions, punched-out lytic lesions, endocortical erosion, etc
	Discuss the differential diagnosis of periosteal new bone formation and differentiate aggressive from benign reactions and their appearance in US, CT and MRI imaging
	Discuss the target joints for different arthritides and their appearance in plain X Rays,US, CT and MRI imaging.
	Evaluate common bone dysplasias and their appearance in plain x ray, US, CT and MRI imaging
	Understand and recognize common metabolic bone disorders and their appearance in plain x ray, US, CT and MRI imaging

Core clinical problem / presentation	Theoretical / practical aspects	Related investigations / procedures
Knowledge	Normal radiological anatomy of the skull, spine, bones and joints and the related soft tissues	X ray, USS, CT, MRI
	Common indications	X ray, CT, MRI
	Availability of the radiological modalities in different centers	X Rays, US,CT, MRI, Nuclear imaging
	Modality of choice for the best and least expensive evaluation of a disease process in an anatomical site and alternative imaging modalities	X Rays, US,CT, MRI, Nuclear imaging
	Radiological and technical steps for doing	X Rays, US,CT, MRI, Nuclear imaging
	Indications and procedural steps for performing special radiological investigations	Arthrograms, guided injections, dynamic assessment studies and other procedures
	Viewing pattern that answers the clinical questions and presents relevant findings	X Rays, US,CT, MRI, Nuclear imaging
Skeletal trauma	Reporting the description of fractures, position and alignments radiologically	x ray/CT/MRI
Soft tissue trauma	Reporting of soft tissue trauma, spinal injuries	x ray US/CT/MRI description of soft tissue injuries, head injuries, spinal injuries
Osteomyelitis and septic joint, spondylodiscitis, tuberculosis, sarcoid and Paget's disease	Evaluating radiological signs	x ray/CT/MRI
Chondrocalcinosis, bone infarcts, epiphyseal, metaphyseal and diaphyseal lesions of bone	Reviewing the differential diagnoses	x ray/CT/MRI
Bone matrices such as osteoid, fibrous and chondroid matrices, different type of muscles, soft tissues, fat	Recognizing different bone matrices, different type of muscles, soft tissues, fat etc and their different radiological appearance in different radiological modalities	x ray/CT/MRI
Common soft tissue and muscle lesions	Discussing the differential diagnosis understand the origin of different appearance	US, CT and MRI
Common osteolytic and osteosclerotic lesions	Discussing the differential diagnosis and understand the origin of metastasis from other organ systems to bone	x ray, US, CT and MRI
Expansile bone lesions, permeative lesions, punched-out lytic lesions, endocortical erosion, etc	Evaluating differential diagnosis	x ray, CT and MRI

Perosteal new bone formation and differentiate aggressive from benign reactions	Discussing the differential diagnosis of periosteal new bone formation and differentiate aggressive from benign reactions and their appearance	US, CT and MRI
Target joints for different arthritides	Discussing the target joints for different arthritides and their	x Rays, US, CT and MRI
Common bone dysplasias	Identifying their appearance	x ray, US, CT and MRI
Metabolic bone disorders	Understanding and recognizing common metabolic bone disorders	x ray, US, CT and MRI

1.10 OBSTETRICS AND WOMEN'S HEALTH

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management		
				Acute condition(s)	Chronic conditions/complications	Rehabilitation
Menstrual patterns 1. Normal menstrual pattern 2. Irregular menstruation 3. Menorrhagia 4.Epimenorrhoea / polymenorrhoea 5. Inter-menstrual bleeding / metrorrhagia	1. Diagnosis based on history 2. Confirm by examination including pelvic exam for cause and effects 3. Consider differential diagnosis	1. appropriate investigations for cause eg U/S, thyroid profile 2. Investigate to check effects eg.haematology	1. General examination for effects of blood loss, 2.per-vaginal examination including speculum	1.Referral for lab tests and U/S etc. 2. While correcting anaemia refer based on cause 3. Cause based specific management		1.Managing Effect on sporting activities and return to sports 2. Effect of medications used for control of menses on sporting activities and doping.
The female athlete 'Triad': Amenorrhea, osteoporosis and disordered nutrition.	Diagnosis based on clinical features. Differential diagnosis of the three manifestations. Eg thyroid disease, psychological disorders	Endocrine tests, bone density tests etc	Referral for nutritional assessment And Psychological assessment		Intensive nutritional counselling.	Exercise and sports rehabilitation.

	causing eating disorders, Iry ovarian failure etc.					
1.Basic aspects of fertility Development and biological processes involving the male and female gametes, gonads, reproductive tract and controlling mechanisms **2. Common deviations and aberrations.**	1.Relevant clinical features of(menstrual pattern etc.): 1.Normal gender differentiation 2.Gametes and gonadal functions 3.Reproductive tract structure 4. Reproductive tract controlling mechanisms	1.Principles of use of imaging techniques (U/S etc.) 2.Reproductive endocrine assessment 3.Genetic assessment	Referral for special tests giving reason for requesting the investigation and what aspects should be clarified.		Seeking condition specific advice for management.	Exercise protocols which would promote normal reproductive health and help when there are deviations
Application for management of infertility at Level 1, Level 2 and principles in Level 3	2.Clinical features on history and examination for use in treatment of infertility at level 1 and level 2.	Awareness in: 1.Using the Seminal analysis to screen for male fertility status. 2.Role of U/S and endocrine tests in evaluating the ovulatory potential. 3.Use of tubal patency tests	1.Explaining to infertile couples the practical aspects of these investigations 2.Providing patient information on the subsequent management using procedures in Level 1 and Level 2 treatment.		Explaining to clients who fail to become pregnant from level1 and 2 treatment the principles and introduce the processes of level 3 (ART) treatment.	Providing psychological support to overcome the mental stress caused by childlessness.
Application for fertility control (contraception / family planning)	Clinical features on history and examination for use in fertility control and family planning.	1.Investigations used in the screening of clients before selecting a contraceptive method. 2.method specific investigation for follow up.	1.Guiding and assisting clients to select a FP method using the principles of 'informed choice'. 2.counselling clients in the use of individual FP methods. 3.Providing methods such as IUDs, Implants etc after adequate training.			Evaluate individually the effect if any that the use of the FP method has on sports performance. eg. Hormonal methods

Pre conception / pregnancy assessment and preparation	History and examination to detect health status and any existing diseases (eg, BP, diabetes which may influence pregnancy.or they may become worse during pregnancy	Appropriate investigations as Preconception Screening tests depending on presence or absence of established diseases eg. Ch.hypertension, diabetes, heart disease etc.	1.Thorough system based physical check to assess health status diagnose any disease and determine prognosis during pregnancy		1. Enhance health status and fitness. 2.If a disease is present referral for specialist opinion on total management pre and during pregnancy including prognosis. 2.Manage disease as in primary care till referral.	Determine level of physical activity advisable during pregnancy and return to sporting activities after the pregnancy is concluded.
Pregnancy T1 **1.Normal pregnancy** **2.Early pregnancy vomiting** **3.Bleeding in intrauterine pregnancy:** **3.1.abortions** **3.2. H.mole** **3.3. Lower genital tract lesions** **4.Extra uterine (ectopic) pregnancy.**	Specific problem based History and examination to confirm diagnosis, exclude other conditions in the DD and determine severity and complications	Urinary and serum HCG and U/S scan to diagnose pregnancy, detect location and determine the state of the pregnancy. Other antenatal routine blood and urine tests.	Refer for specific care if pregnancy complications are present.	Management of : 1.Hyperemesis gravidarum 2. Abortion and other bleeding disorders in pregnancy. 3. Ectopic pregnancy.	Routine ante-natal care including nutrition, Folic acid, etc. T1 abnormality may need in-ward care. eg. In Hyperemesis gravidarum, ERPC, IV fluids , laparoscopy / laparotomy etc. Keep patient haemodynamically stable till referral	Parentcraft classes with appropriate guidance
Pregnancy T2 and T3 **1.Normal pregnancy** **2.Deviations such as malpresentations etc.** **3.Complications such as PIH, IUGR, APH etc.**	Assess routine ante natal care 1. Determination of risk status for the rest of the pregnancy and detection of high risk situations. 2. The prophylactic measures such as the use of folic acid, low dose aspirin etc. 3. Health Eduction specific for each patient	1. Relevant blood tests and other investigations to determine maternal and fetal welfare. 2.In medical disorders tests relevant to determine disease control.		Provision of ante natal care in: 1.Normal pregnancy 2. Individual deviation and complication.	Continued ante-natal in both normal and complicated pregnancy.	1.Ante-natal physical activities and exercise. 2.Preparation for post natal physical activity and exercise.

Post natal care in early and later puerperium (Normal and with complications)	1.Gather details from the patient and her records to determine the status of health of herself and her baby in the early and later puerperium. 2.Parentcrafting and neonatal care including lactation management. 2.Be knowledgeable on the clinical features of the significant complications during the puerperium (eg. Puerperal pyrexia, puerperal sepsis, secondary post partumhaemorrhage etc.)	1.Haematological tests to determine normal haemodynamic status. 2.Full blood count, "C"reactive protein, microbiological tests to assess the presence of genital tract infections.	Provision of family planning eg. IUCD, implant insertion.	Management of : 1. Puerperal pyrexia, puerperal sepsis, 2.secondary post partumhaemorrhage 3.Breast feeding disorders, mastitis, breast abscess		1.Routinepost natal exercises to strengthen abdominal muscles and pelvic floor. 2.exercises and rehabilitation for specific sporting activities.
Reproductive tract neoplasms (Benign and malignant)	History taking based on Anatomical location, pathophysiology, age related prevalence, life styles, hormone use etc	Tests to assess health status eg.Hb. Screening tests: 1.Cervical cytology 2.Tumour markers (CEA, CA 125 etc) 2.Genital tract imaging by ultrasound, CT and MRI	Referral for special tests and treatment.	Detection of acute complications such as : Fibroids – severe menorrhagia, red degeneration Ovarian cysts: torsion, haemorrhage, rupture etc. Carcinoma cervix: Haemorrhage Proceed with event related	Management through chemo / radio therapy and followup.	Treatment, rehabilitation and return to sporting activity

				management.		
Endometriosis / adenomyosis	Features in the history: Typical congestive Dysmenorrhea, menorrhagia, localized symptoms and signs DD: PID and Acute appendicitis.	Investigations : 1.Visible lesions eg. Umbilical, nodules in vaginal vault. 2.U/S scan of abdomen and pelvis 3.CA 125. 4.Histo-pathology when lesions are excised or by biopsy	Be aware of the role of laparoscopy for diagnosis and treatment.	Referral Management of acute complications eg. Ruptured / leaking endometrioma, infected endometrioma.	1.Symptomatic management. 2.Medical management with hormones 3.Surgical excision of lesions 4.Fertility related management	1.Effects of surgical and medical treatment on sports and exercise performance. 2.Issues related to recovery from this very debilitating condition. 3. confusion with performance enhancing drugs.
Vaginal discharge :	History of different types of vaginal discharge **1.Physiological discharges (leucorrhoea)** **2. Reproductive tract infections** **3.Benign uterine and lower genital surface lesions** **4.Lower genital malignancies**	1.Direct visual features 2.Dry and wet smear microscopy. 3.Microbiological tests 4.Cytological smears 5.???PCR 6.Biopsy of suspected malignancies.	1.Speculum examination 2.Collect per vaginal samples and swabs for investigations when possible (or refer).	Treat acute vaginitis	Cause specific treatment	Depending on duration and severity of problem rehabilitation and return to sports and exercise.
STI, HIV/AIDs	By Dr. NalakaAbeygunewardena					
Post reproductive period : Climacteric, post menopause, andropause	1.History to diagnose menopause and manifestations. 2.Status of physical	1.Serum FSH to confirm ovarian failure (Climacteric / menopause)	Promote age based annual health check amongst public and sports personalities	Cause related acute complications specially injuries	Continuing support for maintaining a healthy life style.	Specific exercises and encourage to participate in

	activity and exercise.	2.Health check investigations. 3.Special investigations for complications (eg.Mammogram, bone density check etc.)				local, national or international 'Masters' sporting activities.
Hormone treatment **1.Menstrual disorders** **2.Contraceptives** **3.HRT** **4.related to banned drugs**	Check each patient for indications, suitability of medication for purpose, consider side effects etc.	Appropriate cause based investigations.				Individually planned long term use

1.11 PSYCHIATRY

Task	Core competencies	Content
Identifying psychological problems in sportsman	Taking a history to identify psychological problems in sportsman	Develop the ability to obtain a Psychological history ranging from childhood factors and personal factors as well as sporting history with view of identifying key performance indices.
	Mental state examination	Identify psychological factors of a sportsman via interview as well as observation in practice and during competition
	Identifying mental strengths/Weaknesses in sportsmen	Preforming a "SWOT" analysis on a sportsman specific to psychological factors.
Enhancing performance	Be competent in helping a sportsman set realistic goals to improve performance Able to motivate individual sportsman as well as conduct motivational sessions for teams Identifying stress and methods of stress reduction such as relaxation Identify problems in the long term sportsman and liaising with coaches/ parents to maintain performance	Goal setting Motivation Dealing with stress Avoiding burnout Team dynamics leadership

	Understand the principles of team dynamics and applying them to relevant group Leadership principles and factors which make good leaders and ability to help captains of sporting teams improve	
Identifying important Psychiatric Illnesses	Be able to pick the early signs of presentation of the below mental illnesses and provide initial counselling and psycho education. If condition severe and causing a drop in performance or any risk identified to refer appropriately	Depression Anxiety disorders Psychotic Illnesses Childhood mental illnesses

1.12 STD

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management			
				Emergencies	Acute condition	Chronic conditions	Rehabilitation
Genital ulcers	• Genital herpes • Syphilis • Chancroid • Candidiasis • Scabies • Drug eruption • Irritant dermatitis • Other common non-venereal causes	• Dark ground • Giant cells • HSV culture • Serology	• Obtaining smear for DG • Obtaining smear for giant cells		• Treat the condition with appropriate antibiotics, antivirals, antifungals etc. • Supportive management. Cleaning ulcers, analgesics etc	• Screen the patient for other STDs • Partner management	Counselling and introducing safe sexual behaviours
Urethral discharges	• Gonococcal urethritis • Nongonococcal urethritis • Common non-venereal causes	• Urethral smears • Urine deposits • Gonococcal culture • Chlamydia PCR	• Obtaining urethral smear		Treat the condition with appropriate antibiotics.	• Screen the patient for other STDs • Partner management	Counselling and introducing safe sexual behaviours
Vaginal discharges	• Gonococcal cervicitis	• Cervical smears • Urethral smears	• Obtaining urethral, cervical and		Treat the condition with	• Screen the patient for other STDs	Counselling and introducing safe

	• Nongonococcal cervicitis • Trichomoniasis • Candidiasis • Bacterial vaginosis • Common non-venereal causes	• Vaginal smears • Cervical cultures • Chlamydia PCR	vaginal smears • Obtaining urethral and cervical cultures		appropriate antibiotics, antifungals etc.	• Partner management	sexual behaviours
Genital Lumps	• Warts • Syphilis • Molluscum • Scabies • Common non-venereal causes	• Serological tests • Biopsy			Treat the condition appropriately	• Screen the patient for other STDs • Partner management	Counselling and introducing safe sexual behaviours

1.14 DENTAL, EYE AND EAR

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management		
				Acute condition(s)	Chronic conditions/complications	Rehabilitation
Key for level of competence	History taking Physical examination Disease mechanisms Complications	Level of competence: 1. Making a referral / request 2. Observation 3. Performance 4. Interpretation	Level of competence: 1. Making a referral/ request 2. Observation 3. Performance	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management	Level of competence: 1. Referral 2. Initial management and referral 3. Management
Normal visual function.	Normal visual acuity – near, distant, Color vision Visual fields Binocular vision Contrast sensitivity.		Test visual acuity and color vision. Interpret the test of visual filed, contrast sensitivity and binocular single vision.			

Visual impairments/conditions that contraindicate or non-favourable for certain sports	Conjunctivitis Foreign bodies in the eye Chemical burn Orbital injuries Globe injuries			[2]Conjunctivitis Foreign bodies in the eye Chemical burn Orbital injuries Globe injuries		
Common ophthalmic diseases	Diabetic retinopathy Cataract Glaucoma Steroid complication			[1]Diabetic retinopathy Cataract Glaucoma Steroid complication		
Advice on spectacles contact lenses and protective eye wear	Spectacle types, contact lenses and their complication, protective eye wear and indication.		[1]Physical identification of each type, identify complications			

1.15 ENT

Core clinical problem / presentation	Differential diagnosis	Related investigations	Related procedures	Related management		
Traumatic Perforations		PTA in selected cases (1)	N/A	Refer to an ENT Unit, Keep the ear dry, Periodic assessment by an ENT specialist (1)	Persistent Perforation may need surgery, refer to an ENT unit (1)	
Ossicular Discontinuity	Important to be aware in hearing loss following trauma to head, may need early treatment	PTA (1)	N/A	Refer to an ENT Unit, Assessment by an ENT specialist (1)	may need Ossiculoplasty (1)	
Inner Ear						

Temporal Bone fractures	Important to assess concomitant intra cranial injuries, methodical assessment of outer, middle and inner ear, detect and note facial nerve paralysis and CSF leaks	Xray Skull, Cervical Spine, CT temporal bones and brain (1)	N/A	Refer to an ENT Unit, Assessment by an ENT specialist (1)	May need facial nerve decompression (1), May need Management of CSF Otorrhoea by ENT Specialist (1)	
	IF there is facial paralysis at the onset patient needs urgent decompression of the facial nerve					
Nose						
Epistaxis			First aid measure of controlling nasal bleeding (3), Nasal Packing (2)	Nasal Packing (2), cautery (2), arterial ligations, EUA nose and cautery (2)		
Nasal Bone Fracture	Important to note deformity, presence/absence of septal haematoma and continuous epistaxis	Xray nasal bones, further imaging with CT in selected cases with severe injuries (1)	First aid measure of controlling nasal bleeding (3), Nasal Packing (2)	May Need MUA, Drainage of septal haematoma (2)	Septorhinoplasty(2)	Septorhinoplasty(2)

Facio-maxillary fractures	Important to note airway adequacy, deformity, pretense/absence of septal haematoma and continuous epistaxis, Dental occlusion	Xray nasal bones, further imaging with CT in selected cases with severe injuries (1)	First aid measure of controlling nasal bleeding (3), Nasal Packing (2), OMF opinion	May Need MUA, Drainage of septal haematoma (2), Mandibular fixations, maxillary wiring etc (2)	Septorhinoplasty (2) OMF interventions (2)	Septorhinoplasty, OMF Interventions(2)
Diving Related Injuries		PTA in selected cases (1)		may need management of decompression sickness - may need surgery if Perilymphatic Fistula (2)		
Laryngeal Trauma						
Penetrating and non penetrating	Important to assess the upper aerodigestive tract	CT, Endoscopies Flexible Rigid Barium Studies (1)	First aid and refer to specialist management (2)	May need tracheostomy (2), May need neck exploration and repair (2)	May need tracheostomy care (2)	May need tracheostomy care (2)
	Important to follow ATLS or similar guidelines, ABCDE, GCS score					
Diving injuries in ENT	Decompression sickness	Diagnosis and appropriate referral				
	Baro trauma					

1.16 PUBLIC HEALTH

Public health commitment	Theoretical aspects	Teaching / learning	Assessment
Promoting physical health as a measure of preventing NCDs	Role of physical activity in health and disease	• Theoretical inputs (During the first two weeks using lecturers, small group discussions, assignments, journal clubs, seminars, etc.) • Field work in an community / based attachment: (For nine weeks with face-to-face sessions for progress evaluation at second, sixth and ninth weeks)	Project report During the final week of the public health attachment
	National policies in relation to physical activity		
	Principles of health promotion		
	Change of behavior		
Planning, implementation and evaluation of community-based physical activity programmes	Public health system in Sri Lanka		
	Health planning and management		
	Communication		
	Collaboration teamwork		

1.17 SPORT AND EXERCISE MEDICINE

Sport and exercise medicine	Objectives	Theoretical aspects	Teaching / learning	Assessment
Team physician	To learn to work efficiently within the multidisciplinary team to maximize athlete performance and in the prevention and management of sports related injuries. To recognize the use and limitations of pre-participation screening and the implications for the athlete of such programmes. To understand the legal and ethical guidelines for doctors working as team physicians and to work within these guidelines at all times.	Pre- Participation Screening Aims and challenges of pre-participation screening Justification for pre-participation screening Sport-specific pre-participation screening Screening components (Questionnaire, history, examination, investigation) Health education and pre-season assessment Development of skills and normal physical maturation Protective equipment Medical equipment,	•Clinical appointment •Lectures •Demonstration •Observations	Portfolio.

		pharmacy supplies required for coverage of teams Structuring training to prevent injury Doping classes and methods / permitted use of banned drugs / Doping control Traveller's health issues, combating jet lag and immunizations Athlete confidentially and medico-legal aspects of team care Disordered eating, female athlete triad Child protection Knowledge of the contra-indications to participation in sport and exercise Familiarity with the range of agencies which can provide care and support		

		both in, and out of, hospital and how they can be accessed		
Event physician	To develop the ability to carry out a full risk assessment for a sports event and to develop an appropriate action plan to provide medical care, consistent with the statutory requirements for such an event. To demonstrate the ability to take a leadership role within the medical team covering a sports event and to audit the effectiveness of medical support provided at sports events	Legislative and medico-legal guidelines with regard to medical and crowd safety facilities at sporting venues Guidelines for number and type of medical personnel required for sporting events with large participant numbers and/ or large crowds Relevant EU safety legislation governing the running of sporting events with large participation numbers and/ or large crowds Procedures for evacuation of injured athlete or member of the crowd from any given sporting event Procedures for evaluating		

		requirements in terms of pharmacy supplies, medical equipment, medical personnel, paramedical personnel and communication equipment at any given sporting event		
Specific Sports	To develop an understanding of a range of team and individual sports and to gain expertise in treating athletes from different sporting backgrounds, becoming aware of the specific demands and injuries associated with these sports. Knowledge of a range of sports in terms of rules and regulations, physiological requirements and injury risk profiles	These sports to include at least one example from a minimum of two from the following categories which were not covered in the previous two years: Team Sports – Contact / collision e.g.: football (soccer), Rugby (Union), Field Hockey. Team Sports – Non contact e.g: Cricket, Basketball, Netball, Volleyball. Combat Sports e.g.: Martial Arts, Boxing, Wrestling Track and Field Events		

		including Gymnastics Racquet Sports – Tennis, Squash, badminton Others – Cycling, Triathlon, Rowing, Golf, dance disciplines		
Physical fitness assessment and testing	Importance of assessment and evaluation	Methods of evaluation – Interview, Clinical Examination, Investigative Procedures, Field Tests. (Reliability and Validity of the tests)		
Drugs / anti doping		Drugs in Sports, Banned Substances, TUE, WADA Code, Testing Procedure		
Sports physiotherapy		Taping, massaging, manual therapy, exercise therapy physical therapy		

ANNEXURE 2. Details of Sport & Exercise Medicine Strand

2.1 BASIC SCIENCES PLUS PHARMACOLOGY

Subject area	Level of competence	Theoretical aspects	Practical aspects
Anatomy	Application of theory	Musculoskeletal system Osteology · Joints Types of joints General structure of a synovial joint Individual joints: Surface anatomy in relation to examination / bones / ligaments / surrounding tendons and muscles / stability and weaknesses / movements / innervation / Shoulder / elbow / wrist / joints of the hand Hip, knee, ankle · Vertebral column Vertebra Ligaments and joints Muscles – erector spinae · Neuroanatomy Cerebrum / Cerebellum / Brainstem Spinal cord Cranial and spinal nerves Brachial, lumbar and sacral plexuses • Skeletal muscles Motor units	• Review of anatomy knowledge through tutorials, cadaveric dissections, museum specimen based tutorials and discussions. • Discussion of clinical scenarios with relevance to clinical anatomy and radiological imaging

		Skeletal muscle structure/ function Fibre types • Cardio-respiratory system • Anatomical variations and predisposition to injuries and their prevention and management. • Radiological anatomy	
Pharmacology	Application of theory	**1. General Pharmacology** Pharmacodynamics, Pharmacokinetics and Drug Approval Process related to medicines used in sports medicine **2. Analgesics and other drugs for pain** Opioid Medications, -paracetamol, NSAIDs, COX2 inhibitors muscle relaxants local anesthetics for the athlete **3. Cardiopulmonary agents** Beta-Blockers, Diuretics, Other Antihypertensive Agents, Sympathomimetics, Bronchodilators and Respiratory Anti-inflammatory Agents **4. Drugs for Diabetes Mellitus** Oral hypoglycemic drugs, insulin **5. Hormonal agents** Human Growth Hormone Androgenic-Anabolic Steroids steroid use and steroid abuses dihydroepiandrosterone **6. Metabolic agents** Creatine and beta-hydroxy-betamethylbutyrate Iron and Erythropoietin Antilipemic Agents Nutritional Supplements miscellaneous sports supplements	

		7. Socially used drugs Caffeine Ethanol Amphetamines and Cocaine Cannabis **8. Management of anaphylaxis** Principles of management and medications used	

2.2 SPORTS DOCTOR

Level of competence	Theoretical aspects	Practical aspects
Application of theory	Section 1. An Introduction to Sport& Exercise Medicine 1. Exercise & the Nation's Health - the Govt Agenda for Health, the nature of exercise, the benefits of exercise, the risks of exercise 2. The Administration of Sport in the Sri Lanka - government, Regional & Local Govt, schools, private/commercial sector 3. The Practice of SEM - Roles: * General Practice * GPWSI Clinic * Team Doctor * Crowd/Event Doctor * Specialist Sports Medicine Clinic * National Governing Bodies * Academic Posts 4. SEM Specialist Training 5. Sri Lanka SEM and Associated Organisations - 6. International organisations: Section 2. The Team Doctor - role and responsibilities Section 3. Doping Section 4. Ethics and Law in Sports Medicine 1. Ethical Challenges in Sports Medicine - recognised professional standards, patient care, the imperative to compete and win, short term gain v long term health, gender 2. Child Protection 3. Clinical Records and Confidentiality - clinical record keeping and storage, confidentiality; doctor-athlete-club/coach relationship, handling matters related to media, data protection act 4. Management of Pharmaceuticals - the law, storage, prescribing, dispensing, Import/Export, Patient Group Directives 5. Insurance - UK, travelling abroad	

2.3 EXERCISE PHYSIOLOGY

Level of Competence	Theoritical aspects	Practical aspects
1. Application of theory 2. Technical assessment skills	1. What is exercise physiology: definition, origins, applications 2. Involvement of bodily systems in exercise: 2.1. Metabolic system 2.1.1. Cellular metabolism and biomechanical pathways of energy production: aerobic, anaerobic, intramuscular phosphate 2.1.2. Human energy transfer systems during exercise: 2.1.2.1. Energy release from various sources including fats, carbohydrates, proteins (*more will be done in the Nutrition module)* 2.1.2.2. Substrate utilization during exercise 2.1.3. Energy systems in exercise: Immediate and long term release of energy (phosphagen, glycogen-lactic acid and aerobic systems), 2.1.4. Lactate transfer, VO2 kinetics,	1. Estimating maximal oxygen consumption 2. Wingate test for maximum anaerobic power 3. Maximum strength measurement: Hand dynamometer, Back and hamstring dynamometer, Shoulder dynamometer, Isokinetic testing 4. Neuromuscular testing: Surface EMG, Nerve Conduction Studies (NCS), Transcranial Magnetic Stimulation (TMS) 5. Lung Function testing 6. Calculating energy utilization 7. Cognitive and psychomotor skill testing

	oxygen lag / debt. 2.1.5. Measurement / energy costs of exercise: basal metabolic rates, calorimetry / daily energy expenditure 2.2. Cardiovascular system: 2.2.1. Cardiovascular responses to exercise: changes in heart rate, stroke volume, blood pressure, peripheral resistance and regional blood flow and their physiological basis in response to 2.2.1.1. dynamic exercises 2.2.1.2. static exercises 2.2.2. Cardiovascular adaptations to exercise 2.2.2.1. Cardiovascular adaptations to endurance training (long term aerobic exercise): changes in cardiac dimensions, coronary blood flow, blood volume, heart rate, stroke volume, blood pressure, maximal oxygen consumption, blood pressure, total peripheral resistance, muscle blood flow 2.2.2.2. Cardiovascular adaptations to dynamic	

	resistance training: cardiac dimensions, heart rate, stroke volume, blood pressure, maximal oxygen consumption 2.3. Respiratory system: 2.3.1. Respiratory response and the physiological basis in dynamic aerobic exercise 2.3.2. respiratory training adaptations: lung volumes and capacities, pulmonary ventilation 2.4. Neuromuscular system: 2.4.1. Muscle strength, power and endurance: principles and assessment techniques. *2.4.2.* Classification of muscle contractions *(more will be covered in the kinesiology, biomechanics modules)* 2.4.3. The concepts of motor unit and physiological mechanisms of muscle contraction 2.4.4. Muscle fibre types 2.4.5. Neuromuscular adaptations to exercise training: 2.4.5.1. Progressive resistance training 2.4.5.2. Dynamic aerobic training	

	2.4.6. Muscle fatigue 2.4.7. Motor coordination and involvement of brain areas in sports 2.5. Hormones and endocrine systems in exercise: Effect of hormonal factors in two genders on exercise adaptations and physical fitness and hormonal changes in adolescence on exercise adaptations and physical fitness etc. 3. Environment and exercise: 3.1. Thermoregulation (circulatory and hypothalamic responses): exercise in heat, exercise in cold 3.2. Exercise at altitude 3.3. Exercise under water 3.4. Exercise in low gravity 3.5. Principles of training and adaptations in extreme environment 4. Principles of training: 4.1. Aerobic 4.2. Anaerobic 4.3. Adaptations to training (linked with 2 above) 4.4. Training regimes 4.5. Maintenance and over-reaching 5. Strength and Conditioning 5.1. Anabolic and catabolic processes	

	5.2. Resistance / eccentric training 5.3. (Isotonic, Isometric, Isotonic Auxotonic (including Variable-resistance, Velocity-dependent Loads, etc.) 6. Children / pregnancy 7. Physiological changes 8. Affect on muscle / bone / neural / cardiovascular system 9. Monitoring of training principles 10. Monitoring of exercise capacity / training / overtraining 11. Fitness assessment 11.1. Definition of physical fitness 11.2. Different components of fitness 11.2.1. Health-related and sports/position-specific 11.2.2. Rationale for performing assessment tests for aerobic fitness, anaerobic fitness, strength, power, speed, agility, flexibility, body composition Strength and Power Training Exercises 11.3. Principles of Training and Adaptation 11.4. Exercises for Upper Body 11.5. Exercises for Lower Body 11.6. Bilateral versus Unilateral Exercises	

	11.7. Weights vs Machines 11.8. Velocity-dependent Resistance Exercises (Aquatics) 11.9. Plyometrics 11.10. Designing Training Programmes 12. Flexibility Exercises 12.1. Shoulders, Hips, Lumbo Pelvic Hip Complex, etc 12.2. Different stretching Modalities (E.g. Pilates, Yoga, etc). 8. Genetics and exercise	

2.4 SPORTS NUTRITION

Level of competence	Theoretical aspects	Practical aspects
1. Plan and program sport-specific nutrition services for individuals, teams, clubs, community groups, fitness and wellness centres, military, police etc. 2. Screen, assess, follow up, and monitor athletes and active individuals in a variety of settings, integrating both nutrition and sports principles and skills 3. Effectively integrate nutritional interventions into the annual training and competition plan of athletes at the elite and professional level 4. Provide nutrition education and services to exercising individuals and active community groups with focus on health promotion, fitness, weight maintenance and loss, and disease prevention	1. Sport nutrition a. study of the proper nutrition for training, b. role of macro and micronutrients on the physiological processes of the body and the importance of nutrients. c. Conditions affect athletes of all age groups regarding nutrition 2. Dietary and nutritional supplementation for Athletic performance a. Nutrition assessment, anthropometry assessment and screening b. In depth study of the efficacy of dietary and nutritional supplements used to enhance athletic performance and improve activities of daily living. c. Use of dietary supplements as ergogenic aids 3. Exercise, nutrition and weight control a. Explores the interrelationship between nutrition, energy metabolism and exercise performance b. Dietary planning for weight gain and weight loss, spots specific concerns	1.Applied Placement: Practical and clinical practice a. Field experience in a sport and exercise science organisation, association, business, fitness or wellness centre

2.5 SPORTS INJURIES & REHABILITATION

Level of competence	Theoretical aspects
Application of theory	The types and causes of injury, examination and history taking of injuries to joints. The dynamic stresses of individual sports. Sport-specific injuries,diagnosis of injury, management and principles of preventing injury. * Causes and types of injury - mechanisms of injury including importance of overuse injuries * The foot - normal foot movement, common problems, possible causes and management. * The ankle - normal movement and common problems, possible causes and management. * Shin and Calf - differential diagnosis and possible causes of lower leg pain including stress fractures, tibial-fibular dysfunction, nerve injury and compression * The knee - differential diagnosis, causes and management of knee pain, including overuse and need to refer for specialist investigation and intervention * The thigh - quadriceps and hamstring function, flexibility and strength * The hip - problems related to bursitis, stress factor and adolescent hip conditions and effects of exercise on osteoarthritis * The groin - adductor problems, disruption of groin and osteitis pubis pelvic stress fractures * The Head - management of trauma to the head as well as facial and eye injuries * The lumbar region - anatomical features of the spine with the mechanisms of injury and the common disorders with typical pain patterns * The shoulder - impingement, instability and inflammation in context of soft tissue anatomy. The elbow - overuse , and nature of nerve entrapment syndromes in relation to exercise * Wrist and hand - fractures to the carpus and nature/management of soft tissue lesions * Sport-specific injuries - incidence of particular injuries to individual sports.

2.6 BIOMECHANICS AND SPORTS ANALYSIS

Level of competence	Theoretical aspects	Practical aspects
1. Application of theory 2. Clinical and technical assessment skills	Importance of Biomechanics Basic Movement Terminology Kinematics (Linear and Angular) Kinetics (Linear and Angular Force, Newton's Laws, Free Body Diagrams) Work, Energy, Power Conservation of Energy Conservation of Momentum Momentum and Impulse Body Balance (i.e. Static and Dynamic Stability) Impulse and Shock Attenuation Torque and Lever Mechanics Ground reaction force Normal Lower limb biomechanics Common structural abnormalities of lower limb Orthoses Pelvic biomechanics Scapula biomechanics and clinical significance	Biomechanical assessment (Qualitative and Quantitative Analysis) Assessment of lower limb biomechanics Biomechanics related to cycling Ergo meter testing Goniometric measurements Video based measurement of ground reaction force <u>Video based motion analysis of</u> Walking, running and jumping Cricket Racquet sports Throwing sports Overhead activity sports Swimming

	<u>Principles related to</u> biomechanics of walking, running and jumping biomechanics of throwing sports and related clinical problems biomechanics of swimming and related clinical problems biomechanics of Cricket and related clinical problems biomechanics of racquet sports and related clinical problems biomechanics of overhead sports and related clinical problems biomechanics of cycling and related clinical problems Theoretical aspects of Athlete profiling and Talent ID	Athlete Profiling

2.7 PSYCHOLOGY OF SPORTS

Level of competence	Theoretical aspects
Application of theory	Person-centred approaches and their effectiveness in helping individual athletes. Motivation and the effects of stress and anxiety in relation to performance. Factors which predispose athletes to injury and which influence the psychological reactions of the athlete to injury. The effects of team cohesion on performance and explain theories of leadership in the context of sport. * Personality and the athlete - how the personality is defined by examining the main themes and methods of measuring personality. Problems and possibilities of research and importance of a person-centred approach to athletes. * Motivation - factors that define motivation and relating knowledge of processes of motivation to rehabilitation. Links between arousal and motivation and the importance of self-belief * Causal attribution in sport - basic principles of attribution theory and the major research findings in the context of sport. Relevance of theory and research to medical practice * Stress and anxiety in sport - methods of measurement and effect on performance * Psychology of injury - psychological factors that predispose to injury, reaction of athlete to injury and the importance of the psychological dimension in rehabilitation * Psychological preparation of the athlete - strategies to prepare an athlete for performance and discussion of the athlete's needs in development of psychological preparation skills * Social psychology of sport - psychological background to aggression and how it may be controlled. Development of team cohesion and theories of leadership in sport.

2.8 EXERCISE FOR HEALTH

Level of competence	Theoretical aspects	Practical aspects
Application of theory and practice	Strategic priorities and policies related to physical activity -Sri Lanka Govt Agenda for Health -The nation's health -Relevant reports report * Health Behaviour Change -Healthy lifestyle determinants across the lifespan -Individual needs assessment and goal setting -Screening principles and risk assessment -The motivational processes involved in health behaviour change -Practical approaches to support behaviour change at the individual level -Design and evaluation of physical activity interventions * Physical Activity for people with Medical Conditions -Cardiovascular diseases -Pulmonary diseases -Metabolic diseases -Immunological diseases -Orthopaedicdiseeases and disabilities -Neuromuscular diseases -Psychological disorders * Physical activity in Different Population Groups -Children -Women -Older adults.	Exercise prescription for elderly, obese and a person suffering from a medical condition (ex hypertension and ischaemic heart disease) (It will be done in groups)

2.9 SPORT AND EXERCISE MEDICINE IN PRACTICE

Level of competence	Theoretical aspects	Practical aspects
Application of theory and practice in the management of sports injuries	* Learning needs review via Learning Needs Analysis (LNA) and Personal Development Plans (PDPs) as part of a portfolio of experiential learning. * Gaining experience in clinical practice - facilitation and guidance in appropriate clinical experience in a range of setting including team, clinic and pre-hospital trauma settings. * Evaluating the process of critical analysis and reflection culminating in the formulation of reflective case studies. * Evaluating coaching and coach rehabilitation techniques. * Importance of the wider multidisciplinary sports team as it applies to the prevention of injury and rehabilitation * * Theory of evaluating patients in a clinic and formulating a plan for their management.	Clinical examination and biomechanics of upper limb, lower limb and spine including the special examination techniques Practice of first aid and life support measures and Management of muscular skeletal injuries at the field site. Exemption is granted with a suitable pre-hospital trauma certificate) Practice of intraarticular injections, strapping and sports massage techniques

ANNEXURE 3: Details of Research strand

Level of competence	**Theoretical and practical aspects**		**Total time**	**Assessment**
		Teaching Learning Activities		
Application of knowledge	Theoretical basis of Research • Philosophy of Research • Quantitative Research • Qualitative Research • Identifying a researchable problem • Research questions/ hypothesis and objectives • Study designs and methodologies • Bias in research • Ensuring quality of data • Ethics in research	Lectures	45 hours	Concept paper on research problem
Critical analysis	Literature review • Introduction to literature sources • Literature search • Literature review	Lectures and Practicals	30 hours	Literature review
Performance	Developing a research proposal	Lectures and SGDs	45 hours	Research Proposal
Performance	Developing data collection tools • Types of data collection tools • Identifying variables • Operationalizing variables • Developing questionnaires and interview schedules • Developing observational check-lists	Lectures and SGDs	30 hours	Data collection tools
Performance	Data management • Introduction to EpiData	Lectures and Practicals	15 hours	Database

	• Database development • Data entry • Database management			
Performance	Basic data analysis • Descriptive statistics • Inferential statistics • Introduction to SPSS • Using SPSS	Lectures and Practicals	45 hours	Basic data tables
Performance	Dissemination of research • Abstracts • Presentations • Posters • Dissertations • Original papers	Lectures and SGDs Seminar	30 hours	Oral or poster presentation

ANNEXURE 4. Generic format for writing a research proposal

The aim of the research component is to plan and complete a scientific research project, with due appreciation of the need for scientific validity and ethical principles, within organizational and financial constraints. The choice of the research project will be primarily that of the trainee, but this should be discussed with and approved by the supervisor. The trainee should prepare a research proposal which will be submitted to the BoS for approval prior to commencement of the study.

Time frame: the research proposal should be approved within the time period stipulated by the BoS.

Format:

In general, the research proposal should be limited to 3000 words. The following structure is suggested:

- Title of the study
- List of investigators
- Collaborating institutions
- Background/introduction: this should include an overview of the subject related to the research project, with a relevant review of the literature.
- Justification: This section should provide a brief justification of the importance and relevance of the study proposed, including the feasibility of the study.
- Objectives: general and specific objectives of the study should be clearly defined.
- Methods: The methodology to be adopted to achieve the listed objectives should be given in detail; the following sub-sections are suggested as a guide:
    - Study design
    - Study period
    - Study population
    - Sample size calculation
    - Sampling technique
    - Study instruments
    - Data collection
    - Proposed statistically analysis
    - Ethic clearance and consent, and confidentiality of data
    - Proposed methods for dissemination of findings
- Annexes: the following annexes should be provided:
    - Data proforma/s
    - Consent forms, where relevant in all three languages
    - Other relevant supporting documents

The trainees are advised to use Microsoft Word® for formatting documents. The software Endnote®, Reference Manager® or Mendeley® should be used, if possible, for citations. The reference format should follow the Vancouver® Style.

Both soft and hard copies of the documents should be submitted to the BoS, through the supervisor.

ANNEXURE 5. Format for reviewers to report on research proposals

The reviewers of the research project should rate the research proposal as satisfactory or unsatisfactory. The main sections should be rated as satisfactory or unsatisfactory, and, if rated as unsatisfactory, specific comments should be provided. General statements should be avoided, and the reviewers should specifically what deficiencies are present and how they could be addressed.

Section	Satisfactory or Unsatisfactory	Remarks
Background		
Justification		
Objectives		
Methods		
Overall		

Recommendation: Accept as is / Revise and resubmit / reject

If a proposal is rejected altogether, the trainee will be expected to submit a new proposal.

ANNEXURE 6. Guidance to supervisors

1. The supervisor should guide the student in planning, carrying out research methodology and in presentation of the work, including the writing of the dissertation.

2. The supervisor should obtain recommendation of the research proposal from a reviewer.

3. The supervisor should forward progress report(s) in the prescribed form at the end of 3 months after the trainee commences work on the research project and 3 months after completing the project work.

4. The objective of the dissertation is to prove the trainee's capability to plan, carry out and present his/her own research. The purpose of this training is to ensure maturity, discipline and scholarship in research.

5. The dissertation should comprise the trainee's own account of his / her research.

6. It should be satisfactory as regards literary presentation.

7. The dissertation should be certified by the supervisor as suitable for submission.

8. General Comments on the contents: The objectives should be clearly stated and should be feasible to achieve within the time frame. Other published work relevant to the problem (both international and local) should be comprehensively covered and critically evaluated. The research methodology should achieve the objectives stated. The results should be presented effectively. The discussion should include comments on the significance of results, how they agree or differ from published work and theoretical / practical applications of the results, if any. The conclusions should be valid and be based on the results obtained on the study.

9. Ethics: The candidate should confirm and document that procedures followed were approved by the Ethical Committee of the institution where the work was carried out and ethical approval is obtained by a recognized Ethical Committee.

10. If at any time the supervisor is not satisfied with the work progress of the trainee, the trainee should be made aware of the deficiencies and corrective measures suggested. This should be conveyed in writing to the trainee with a copy to the BOS. In such instances, a follow-up report should be forwarded within three months or earlier if necessary to the BOS.

ANNEXURE 7. Format for progress reports

The progress reports should have the following components:

- By the trainee: Description of work carried out to date
- By the supervisor:
    - Whether the research project is progressing satisfactorily
    - Constraints
    - Whether the dissertation writing is on schedule
    - Whether overall progress is satisfactory

ANNEXURE 8: Format for project reports / dissertations

The following format should be adopted for project reports or dissertations

The preliminaries should precede the text. They should comprise the following:

1. Title page

<Title of dissertation>
<Author's name>
MD (subject)
Post Graduate Institute of Medicine
University of Colombo
<Year of submission>

2. Statement of originality: This is a declaration that the work presented in the dissertation is the candidate's own, and that no part of the dissertation has been submitted earlier or concurrently for any other degree. The statement should be signed by the author, and countersigned by the supervisor.

3. Abstract: This should consist of a brief summary of not more than 350 words describing the objectives of the work, the materials and methods used, the results obtained, and the conclusions drawn. This may be in a structured format if helpful.

4. Table of contents: The table of contents immediately follows the abstract and lists in sequence, with page numbers, all relevant divisions of the dissertation, including the preliminary pages.

5. List of tables: This lists the tables in the order in which they occur in the text, with the page numbers.

6. List of figures: This lists all illustrative material (maps, figures, graphs, photographs etc) in the order in which they occur in the text, with the page numbers.

7. Acknowledgments

Text

The dissertation should be divided into clearly defined sections. Sections may be subdivided.

Introduction: The aim of this section is to state briefly the current position and the reasons for carrying out the present work. Generally, only a few references should be cited here.

Literature Review: This section should be reasonably comprehensive, and most of the references to be quoted normally occur here. The relevant references dealing with the general problems should be reviewed first and this is followed by a detailed review of the specific problem. The review is in many cases approached as a historical record of the development of knowledge of the subject. This chapter should conclude with a brief statement of what you propose to find out.

Materials and Methods: These should be described so that a reader could repeat all the experiments. Where specific details are available in the literature, reference should be made to the original papers, and comments kept to a minimum. If modifications have been made to the published techniques, these should be described in full.

Results: Much of the data should be given in tables and figures and these should be inserted in the text at the appropriate place. The results must be fully described in the text. It is not sufficient to merely present the tables and figures without any comment. The tables and figures should be clear without references to the text, and this requires concise explanations in legends. Where possible, data presented in the text should have already been analyzed and the complete 'raw' figures should not be included in this section but should be contained in tables in the Appendix.

Only data from the present work should be included in this section and in particular no comparison should be made at this stage with results from other workers.

Discussion: The discussion is the most difficult part of the dissertation to write because the author has to compare **critically** the present results with those of other workers and to draw valid conclusions from these studies. Descriptions of other workers findings which already appear in the Literature Review should not be repeated in the Discussion. Instead, refer to the Review.

The limitations of the study and recommendations for future research on the subject should also be included in this chapter.

As your project proceeds, keep notes of your thoughts and discussions relevant to this section.

References

All references should be cited in the text. The Vancouver style should be used for references, and should be listed in the order of citation. Endnote®, Reference Manager® or Mendeley® referencing software should be used for citations.