CURRICULUM/STATUTES & REGULATIONS
FOR
5 YEARS DEGREE PROGRAMME
IN
ENDOCRINOLOGY
(MD ENDOCRINOLOGY)

UNIVERSITY OF HEALTH SCIENCES, LAHORE

STATUTES

Nomenclature Of The Proposed Course

The name of degree programme shall be MD Endocrinology. This name is well recognized and established for the last many decades worldwide.

Course Title:

MD Endocrinology

Training Centers

Departments of Internal Medicine with special interest in Endocrinology (accredited by UHS) in affiliated institutes of University of Health Sciences Lahore.

Duration of Course

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

After admission in MD Endocrinology Programme the resident will spend first 6 Months in the relevant Department of Endocrinology as **Induction period** during which resident will get orientation about the chosen discipline and will also participate in the **mandatory workshops** (Appendix E). The research project will be designed and the **synopsis** be prepared during this period.

On completion of Induction period the resident will start formal training in the Basic Principles of Internal Medicine for 18 Months, during this period the resident must get the research synopsis approved by AS&RB. At the end of 2 year, the candidate will take up Intermediate Examination.

During the 3rd, 4th & 5th years, of the Program, there will be two components of the training

1) Clinical Training in Endocrinology
2) Research and Thesis writing

The candidate will undergo clinical training to achieve the educational objectives of M.D. Endocrinology Programme (knowledge & Skills) alongwith rotations in the relevant fields during 4th & 5th year of the Programme.

The clinical training shall be competency based. There shall be generic and specialty specific competencies and shall be assessed by continuous Internal Assessment. (Appendix F&G).

The Research Component and thesis writing shall be complete over the four years duration of the Programme. Candidates will spend total time equivalent one calendar year for research during the training. Research can be done as one block or in small periodic rotation as long as total research time is equivalent to one calendar year.

Admission Criteria

Applications for admission to MD Training Programs of University will be invited through advertisement in print and electronic media mentioning closing date of applications and date of Entry Examination.

Eligibility: The applicant on the last date of submission of applications for admission must possess the:

i) Basic Medical Qualification of MBBS or equivalent medical qualification recognized by Pakistan Medical & Dental Council.

ii) Certificate of one year's House Job experience in institutions recognized by Pakistan Medical & Dental Council Is essential at the time of interview. The applicant is required to submit Hope Certificate from the concerned Medical Superintendent that the House Job shall be completed before the Interview.

iii) Valid certificate of permanent or provisional registration with Pakistan Medical & Dental Council.

Registration and Enrollment

- As per policy of Pakistan Medical & Dental Council the number of PG Trainees/ Students per supervisor shall be maximum 05 per annum for all PG programmes including minor programmes (if any).
- Beds to trainee ratio at the approved teaching site shall be at least 5 beds per trainee.
- The University will approve supervisors for MD courses.
- Candidates selected for the courses after their enrollment at the relevant institutions shall be registered with UHS as per prescribed Registration Regulations.

Accreditation Related Issues of the Institution

A). Faculty

Properly qualified teaching staff in accordance with the requirements of Pakistan Medical and Dental Council (PMDC)

B). Adequate Space

Including class-rooms (with audiovisual aids), demonstration rooms, computer lab and clinical pathology lab etc.

C). Library

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

- Accreditation of Endocrinology training program can be suspended on temporary or permanent basis by the University, if the program does not comply with requirements for residents training as laid out in this curriculum.
- Program should be presented to the University along with a plan for implementation of curriculum for training of residents.
- Programs should have documentation of residents training activities and evaluation on monthly basis.
- To ensure a uniform and standardized quality of training and availability of the training facilities, the University reserves the right to make surprise visits of the training program for monitoring purposes and may take appropriate action if deemed necessary.

AIMS AND OBJECTIVES OF THE COURSE

AIM

The aim of five years MD programme in Endocrinology is to train residents to acquire the competency of a specialist in the field of endocrinology, diabetes and metabolism so that they can become good teachers, researchers and clinicians in their specialty after completion of their training.

GENERAL OBJECTIVES

MD Endocrinology training should enable a student to:

1. Overall assessment of patient care that is effective, safe, timely, efficient, equitable and patient-centered.
2. Medical knowledge about established and evolving biomedical, clinical and cognate sciences (e.g., epidemiological and social-behavioral) and the application of this knowledge to patient care.
3. Interpersonal and communication skills that result in effective information exchange and teaming with patient, their families and other health professionals.
4. Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles and sensitivity to a diverse patient population, providing cost-effective, ethical and humanistic care.
5. System-based practice, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of

health care and the ability to effectively call on system resources to provide care that is of optimal value.

6. Practice-based learning and improvement that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence and improvement in patient care.

SPECIFIC LEARNING OUTCOMES

Following competencies will be expected from a student completing MD Endocrinology training;

1. Diabetes mellitus:

- Recognize differences in the pathogenesis and clinical presentation of type 1 and 2 diabetes. Develop the skills to diagnose and treat acute complications of diabetes such as diabetic ketoacidosis (DKA), hyperglycemic hyperosmolar syndrome (HHS) and hypoglycemia. Recognize different pathophysiology of Insulin Resistance Syndrome including various components of this syndrome and how to treat each one.
- Recognize the important recent studies and various treatment modalities for prevention of diabetes including lifestyle modification and medical therapy and their rationale.

• Recognize various treatment modalities for therapy for type 2 diabetes utilizing sulfonylureas, biguanides, α-glucosidase inhibitors, and thiazolidinediones, and the site of action of each agent in the pathogenesis of type 2 diabetes.

• Recognize the importance of recent clinical trials on the use of ACE inhibitors and angiotensin receptor blockers in prevention of deterioration of nephropathy in diabetes as well as their role in prevention of type 2 diabetes in those patients with impaired glucose tolerance.

2. Thyroid disorders:

• Interpret thyroid function tests for various forms of thyroid pathology.

• Evaluate how various aspects of thyroid function may affect cardiac function and the theory behind such actions.

• Apply the knowledge from clinical trials for treatment of thyroid cancer and measurement of the outcome of such therapies.

• Evaluate thyroid storm and Myxedema coma and their etiopathology and treatment.

• Evaluate theories behind alteration of lipid metabolism in various forms of thyroid disorders.

3. Lipid disorders:

• Recognize the pathogenesis of various classes of dyslipidemias and what aspects are important in the evolution of the Metabolic Syndrome.

• Manage dietary and pharmacological therapies of dyslipidemias.

• Recognize various hypotheses for the development of atherosclerosis, oxidative stress, and the role of antioxidants in the prevention of atherogenesis and the controversy regarding the use of vitamin C and vitamin E.

4. Hypertension:

• Recognize various endocrine organs dysfunction that leads to the development of hypertension and the pathogenesis of each etiologic factor.

• Use the latest advances and diagnostic maneuvers to differentiate between hypertension due hyperaldosteronism, Cushing's, and pheochromocytoma as well as hypercalcemia and hyperthyroidism.

5. Metabolic bone disorders:

• Recognize the important role of diet and hormones in the genesis of osteopenia and osteoporosis.

• Recognize indications for bone densitometry and interpret the results.

• Describe treatment options for various forms of osteoporosis (postmenopausal, corticosteroid-induced).

• Diagnose vitamin D intoxication and vitamin D deficiency describing the clinical features of each and the management of each disorder.

• Recognize Vitamin D intoxication in both children and adults.

• Recognize the metabolic pathway of Vitamin D, the active form of this vitamin, and the site in the body where this vitamin is converted to its active form.

• Recognize the important molecular mechanism of PTH in bone and other tissue. Diagnose various forms of hypo and hyperparathyroidism.

6. Calcium:

• Distinguish between hypercalcemia of neoplastic origin versus hypercalcemia associated with parathyroid adenoma.

• Diagnose by imaging method between hyperparathyroid and thyroid disease; the medical versus surgical management; and theory behind each method.

• Describe the management of hyper and hypocalcemic crises and the theory behind such therapies.

7. Adrenal disorders:

• Recognize the physiology and pathophysiology of adrenal disorders as well as the hypothalamic pituitary adrenal axis disturbances resulting in the over-activity or the under-activity of the adrenal in Cushing's and Addison's.

• Diagnose and manage Cushing's syndrome and adrenal insufficiency

• Describe how to utilize radiological methods to distinguish and locate the site of the tumor.

• Describe how to recognize and manage Addisonian crisis.

• Describe methods to distinguish between primary and secondary hyperaldosteronism and bilateral adrenal hyperplasia

• Describe the clinical signs and differential diagnosis of pheochromocytoma and the pathogenesis of this tumor in multiple endocrine adenomatosis (MEA).

• Describe the latest advancements in the understanding of the metabolic pathway of adrenomedullary hormones and various metabolites.

• Describe how various medicines may interfere with urinary tests in the work-up of pheochromocytoma and what may be done to avoid these problems.

8. Pituitary disorders:

- Recognize the clinical symptoms and signs of hypopituitarism and hyperpituitarism (acromegaly, Cushing's disease, prolactinoma), and be able to distinguish the etiopathologic pathways for development of each.
- Describe the pathogenic pathways for the development of Cushing's disease and how to diagnose by use of radiological manipulation.
- Be able to tell the percent surgical success for the major pituitary tumors (acromegaly, Cushing's, and prolactinoma).
- Describe the alternative methods to surgical procedures in the above-mentioned pituitary tumors. Distinguish between a pituitary apoplexy and empty Sella and propose a work-up for each.

9. Gonadal dysfunction:

- Diagnose male hypogonadism and prevalence in the general population verses individuals with type 2 diabetes.
- Diagnose and treat impotency and anorgasmia.
- Diagnose hypogonadism in the female including primary and secondary amenorrhea and how to distinguish, diagnose, and treat such conditions.
- Explain the latest theory regarding the evolution of the polycystic ovary syndrome (PCOS) and the effect of insulin on the evolution of such a syndrome.
- Explain the role of PCOS in the development of metabolic syndrome and the latest theory on managing such patients by medical intervention.

10. Other Aspects of Endocrine and Metabolic Disease Management:

- Recognize the controversy regarding hormone replacement therapy and the data presented to justify or discourage the use of such hormones in different populations.
- Describe the use of appropriate medications in regard to efficacy, cost, and side effects in various endocrine disorders.

REGULATIONS

Scheme of the Course

A summary of five years course in MD Endocrinology is presented as under:

Course Structure	Components	Examination
At the End of 2nd year of MD Endocrinology Programme	• Basic Principles of Internal Medicine • Relevant Basic Sciences (Physiology, Pharmacology, Pathology)	**Intermediate Examination** at the end of 2nd Year of M.D. Endocrinology Programme Written = Marks 300 Clinical, TOACS/OSCE & ORAL =Marks 200 **Total = 500 Marks**
At the end of 5th year of MD Endocrinology Programme	**Clinical component** • **Professional Education in Endocrinology :** Training in Endocrinology with Compulsory/ Optional rotations **Research component** Research work / Thesis writing must be completed and thesis be submitted atleast 6 months before the end of final year of the programme.	**Final Examination** at the 5th year of MD Endocrinology Programme Written = 500 Marks Clinical, TOACS/OSCE & ORAL=500 Marks CIS = 100 Marks Thesis Evaluation = 400 Marks **Total = 1500 Marks** Thesis evaluation and defence at the end of 5th year of M.D. Endocrinology Programe.

Intermediate Examination of M.D. Endocrinology *Programme*

All candidates admitted in MD Endocrinology course shall appear in Intermediate Examination at the end of 2nd calendar year.

Eligibility Criteria:

The candidates appearing in Intermediate Examination of the M.D. Oncology Programme are required:

a) To have submitted certificate of completion of mandatory workshops.
b) To have submitted certificate / certificates of completion of first two years of training from the supervisor / supervisors of rotations.
c) To have submitted CIS assessment proforma from his/her own supervisor on 03 monthly basis and also from his/her supervisors during rotation, achieving a cumulative score of **75%**.
d) To have submitted certificate of approval of synopsis or undertaking / affidavit that if synopsis not approved with 30 days of submission of application for the Intermediate Examination, the candidate will not be allowed to take the examinations and shall be removed from the training programme.
e) To have submitted evidence of payment of examination fee.

Intermediate Examination Schedule and Fee

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

At the end of 2nd year M.D. Endocrinology Programme

Written Examination	=	300 Marks
Clinical, TOACS/OSCE & ORAL	=	200 Marks
Total	=	500 Marks

Written Paper	**=**	**300 Marks**
MCQs	=	100 (2 Marks each MCQ)
SEQs	=	10 (10 Marks each SEQ)

Clinical, TOACS/OSCE & ORAL	**=**	**Total Marks 200**
a) 4 short Cases	=	100 marks

b) Long Case = 50 marks
c) Toacs/OSCE & Oral = 50 marks

Written Paper

Principles Internal Medicine	=	70 MCQs	7 SEQs
Specialty	=	10 MCQs	1 SEQ
Basic Sciences	=	20 MCQs	2 SEQs
Physiology	=	8 MCQs	1 SEQ
Pharmacology	=	4 MCQs	-------
Pathology	=	8 MCQs	1 SEQ

Declaration of Results

The Candidate will have to score 50% marks in written, clinical and oral components and a cumulative score of 60% to be declared successful in the Intermediate Examination.

A maximum total of four consecutive attempts (availed or unavailed) will be allowed in the Intermediate Examination during which the candidate will be allowed to continue his training program. If the candidate fails to pass his Intermediate Examination within the above mentioned limit of four attempts, the candidate shall be removed from the training program, and the seat would fall vacant, stipend/ scholarship if any would be stopped.

Final Examination of MD Endocrinology Programme

All candidates admitted in MD Endocrinology course shall appear in Final (clinical) examination at the end of structured training programme (end of 5th calendar year), and having passed the Intermediate examination.

Eligibility Criteria:

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

i) To have submitted the result of passing Intermediate Examination.

ii) To have submitted the certificate of completion of training, issued by the Supervisor will be mandatory.

iii) To have achieved a cumulative score of 75% in Continuous Internal assessments of all training years.

iv) To have got the thesis submitted and will then be eligible to appear in Final Examination.

v) To have submitted no dues certificate from all relevant departments including library, hostel, cashier etc.

vi) To have submitted evidence of submission of examination fee.

Final Examination Schedule and Fee

a) Final examination will be held twice a year.

b) The candidates shall have to satisfy eligibility criteria before permission is granted to take the examination.

c) Examination fee will be determined and varied at periodic intervals by the University.

d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.

e) The Controller of Examinations will issue an Admittance Card with a photograph of the candidate on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee. This card will also show the Roll Number, date / time and venue of examination.

Components of Final Examination

Written Part of Final Examination	Total marks 500
Clinical, TOACS/OSCE & ORAL	Total marks 500
Contribution of CIS to the Final Examination	Total marks 100
Thesis Evaluation	Total marks 400

Written Part of Final Examination

a) There will be two written papers which will cover the whole syllabus of the specialty of training with total marks of 500.

b) The written examination will consist of 200 single best answer type Multiple Choice Questions (MCQs) and 10 Short Essay Questions (SEQs). Each correct answer in the Multiple Choice Question paper will carry 02 marks, but an incorrect response will result in deduction of 0.5 mark. Each Short Essay Question will carry 10 marks.

c) The Total Marks of the Written Examination will be 500 and to be divided as follows:
   - Multiple Choice Question paper Total Marks = 400

- Short Essay Question paper Total Marks = 100

d) The candidates securing a score of 50% marks in multiple choice question paper and short essay question paper will pass the written part of the final examination and will become eligible to appear in the clinical and oral examination.

e) The written part result will be valid for three consecutive attempts for appearing in the Clinical and Oral Part of the Final Examination. After that the candidate shall have to re-sit the written part of the Final Examination.

Clinical, TOACS/OSCE & ORAL:

a) The Clinical and Oral Examination will consist of 04 short cases, 01 long case and Oral Examination with 01 station for a pair of Internal and

External Examiner Each short case will be of 07 minutes duration, 05 minutes will be for examining the patient and 02 minutes for discussion. The Oral Examination will consist of laboratory data assessment, interpretation of Radiology images, ECG and others.

b) The Total Marks of Clinical, TOACS/OSCE & ORAL will be 500 and to be divided as follows:

Short Cases	Total Marks = 200
Long Case	Total Marks = 100
TOACS/OSCE & ORAL	Total Marks = 200

c) A panel of four examiners will be appointed by the Vice Chancellor and of these two will be from university whilst the other two will be the external

examiners. Internal examiner will act as a coordinator. In case of difficulty in finding an Internal examiner in a given subject, the Vice Chancellor would, in consultation with the concerned Deans, appoint any relevant person with appropriate qualification and experience, outside the University as an examiner.

d) The internal examiners will not examine the candidates for whom they have acted as Supervisor and will be substituted by other internal examiner.

e) The candidates scoring 50% marks in each component of the Clinical & Oral Examination will pass this part of the Final Examination.

f) The candidates will have two attempts to pass the final examination with normal fee. A special administration fee of Rs.10,000 in addition to normal fee or the amount determined by the University from time to time shall be charged for further attempts.

Declaration of Result

For the declaration of result

I. The candidate must get his/her Thesis accepted.

II. The candidate must have passed the final written examination with 50% marks and the clinical & oral examination securing 50%

marks. The cumulative passing score from the written and clinical/ oral examination shall be 60%. Cumulative score of 60% marks to be calculated by adding up secured marks of each component of the examination i.e written and clinical/ oral and then calculating its percentage.

III. The MD degree shall be awarded after acceptance of thesis and success in the final examination.

IV. On completion of stipulated training period, irrespective of the result (pass or fail) the training slot of the candidate shall be declared vacant.

Submission / Evaluation of Synopsis

1. The candidates shall prepare their synopsis as per guidelines provided by the Advanced Studies & Research Board, available on university website.
2. The research topic in clinical subject should have 30% component related to basic sciences and 70% component related to applied clinical sciences. The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, to collect & analyze the data.
3. Synopsis of research project shall be submitted by the end of the 2nd year of MD program. The synopsis after review by an Institutional Review Committee shall be submitted to the University for consideration by the Advanced Studies & Research Board, through the Principal / Dean /Head of the institution.

Submission of Thesis

1. Thesis shall be submitted by the candidate duly recommended by the Supervisor.

2. The minimum duration between approval of synopsis and submission of thesis shall be one year.
3. The research thesis must be compiled and bound in accordance with the Thesis Format Guidelines approved by the University and available on website.
4. The research thesis will be submitted along with the fee prescribed by the University.

Thesis Examination

a) The candidate will submit his/her thesis at least 06 months prior to completion of training.

b) The Thesis along with a certificate of approval from the supervisory will be submitted to the Registrar's office, who would record the date / time etc. and get received from the Controller of Examinations within 05 working days of receiving.

c) The Controller of Examinations will submit a panel of eight examiners within 07 days for selection of four examiners by the Vice Chancellor. The Vice Chancellor shall return the final panel within 05 working days to the Controller of Examinations for processing and assessment. In case of any delay the Controller of Examinations would bring the case personally to the Vice Chancellor.

d) The Supervisor shall not act as an examiner of the candidate and will not take part in evaluation of thesis.

e) The Controller of Examinations will make sure that the Thesis is submitted to examiners in appropriate fashion and a reminder is sent after every ten days.

f) The thesis will be evaluated by the examiners within a period of 06 weeks.

g) In case the examiners fail to complete the task within 06 weeks with 02 fortnightly reminders by the Controller of Examinations, the Controller of Examinations will bring it to the notice of Vice Chancellor in person.

h) In case of difficulty in find an internal examiner for thesis evaluation, the Vice Chancellor would, in consultation with the concerned Deans, appoint any relevant person as examiner in supersession of the relevant Clause of the University Regulations.

i) There will be two internal and two external examiners. In case of difficulty in finding examiners, the Vice Chancellor would, in onsultation with the concerned Deans, appoint minimum of three, one internal and two external examiners.

j) The total marks of thesis evaluation will be 400 and 60% marks will be required to pass the evaluation.

k) The thesis will be considered accepted, if the cumulative score of all the examiners is 60%.

l) The clinical training will end at completion of stipulated training period but the candidate will become eligible to appear in the Final Examination at completion of clinical training and after acceptance of thesis. In case clinical training ends earlier, the slot will fall vacant after stipulated training period.

Award of MD Endocrinology Degree

After successful completion of the structured courses of MD Endocrinology and qualifying Intermediate & Final examinations (written, Clinical, TOACS/OSCE & ORAL and Thesis), the degree with title MD Endocrinology shall be awarded.

CONTENT OUTLINE

MD Endocrinology

1. Physiology

Cellular organization, structure function correlations and physiological alterations in the endocrine organ systems of body

1. Energy balance, metabolism & nutrition
2. Signal transduction pathways and biology of hormone receptors
3. The thyroid gland
4. Endocrine functions of the pancreas & regulation of carbohydrate metabolism
5. The adrenal medulla and adrenal cortex
6. Hormonal control of calcium metabolism & the physiology of bone
7. The pituitary gland
8. The gonads: development & function of the reproductive system
9. Endocrine functions of kidneys, heart & pineal gland
10. Membrane biochemistry and signal transduction
11. Gene expression and the synthesis of proteins
12. Bioenergetics; fuel oxidation and the generation of ATP
13. Carbohydrate metabolism
14. Lipid metabolism
15. Nitrogen metabolism
16. Enzymes and biologic catalysis
17. Tissue metabolism
18. Biochemical basis of the structure, biosynthesis, secretion and mechanisms of action of hormones present in human body.
19. Hormonal regulation, hormonal control of metabolism and the biochemical basis of commonly occurring endocrine diseases.
20. Aquaporins
21. Biotechnology and concepts of molecular biology with special emphasis on use of recombinant DNA techniques in medicine and the molecular biology of cancer

22. General principles of biochemical investigations
23. Basic techniques in molecular biology
24. Cloning and gene analysis
25. Immunochemical techniques
26. Protein chemistry and enzymology
27. Cloning & PCR
28. Protein chemistry and quantification
29. Electrophoretic techniques; PAGE
30. Immunoblotting
31. Raising and purifying antibodies
32. ELISA

2. Pharmacology

1. The Evolution of Medical Drugs
2. British Pharmacopia
3. Pharmacokinetic Processes
4. Pharmacodynamic Process
5. Drug Effect
    a) Beneficial Responses
    b) Harmful Responses
    c) Allergic Responses
6. Drug Dependence, Addiction, Abuse and Tolerance
7. Drug Interactions
8. Drug use in pregnancy and in children

Growth Hormones

1. Growth hormones, antagonists
2. The gonadotropins, follicle stimulating hormone and leutenizing hormone & human chronic gonadotropins.
3. Gonadotoopin releasing hormones & its analogs
4. GHRH receptor antagonists
5. Prolactin, dopamine agonists
6. Posterior pituitary hormones
7. Oxytocin & its antagonists
8. Vasopresin & its antagonists

Thyroid
Basic pharmacology of thyroid & anti-thyroid drugs

Adrenal
1. Adreno-corticosteroids & adrenocortical antagonists, cortisol, mineralocorticoids, (Aldosteroids, deoxycorticosteroids, fludrocortisones adrenal endogens.
2. Synthesis, inhibitors and gluco-cortical antagonists
3. Mineralocorticoid antagonists

Gonadol Hormones & Inhibitors
1. The ovary (Estrogens, progestins, other ovarian hormones, oral contraceptives, inhibitors and antagonists and ovulation – inducing agents)
2. The testes (Androgens & anabolic steroids, anti-androgens, & male contraception)
3. Pancreatic Hormones & anti-diabetic drugs
4. Insulin, oral anti-diabetic agents
5. Glucagon, islet amyloid polypeptide (IAPP, amylin)

3. Pathology

Pathological alterations at cellular and structural level in the endocrine organ systems of body including non-neoplastic and neoplastic lesions of:

1. Hypothalamus and pituitary gland
2. Pineal gland
3. Thyroid gland
4. Pancreas
5. Adrenal gland
6. Bone

7. Reproductive organs
8. Adipose tissue

MD Endocrinology

Basic Principles of Internal Medicine

Resident should get exposure in the following organ and system competencies (listed below) while considering and practicing each system in terms of:-

- Medical ethics
- Professional values, student teachers relationship
- Orientation of in-patient, out-patients and pulmonary labs
- Approach to the patient
- History taking
- General physical examination
- Systemic examination
- Routine investigations
- Special investigations
- Diagnostic and therapeutic procedures

Course Contents:

1. Cardiovascular Medicine

Common and / or important Cardiac Problems:

- Arrhythmias
- Ischaemic Heart Disease: acute coronary syndromes, stable angina, atherosclerosis
- Heart Failure
- Hypertension – including investigation and management of accelerated hypertension
- Valvular Heart Disease
- Endocarditis
- Aortic dissection
- Syncope
- Dyslipidaemia

Clinical Science:

- Physiological principles of cardiac cycle and cardiac conduction
- Pharmacology of major drug classes: beta blockers, alpha blockers, ACE inhibitors, Angiotensin receptor blockers (ARBs), anti-platelet agents, thrombolysis, inotropes, calcium channel antagonists, potassium channel activators, diuretics, anti-arrhythmics, anticoagulants, lipid modifying drugs, nitrates, centrally acting anti-hypertensives

2. Dermatology;

Common and / or Important Problems:

- Cellulitis
- Cutaneous drug reactions
- Psoriasis and eczema
- Skin failure: e.g. erthryoderma, toxic epidermal necrolysis
- Urticaria and angio-oedema
- Cutaneous vasculitis
- Herpes zoster and Herpes Simplex infections
- Skin tumours
- Skin infestations
- Dermatomyositis
- Scleroderma
- Lymphoedema

Clinical Science:

- Pharmacology of major drug classes: topical steroids, immunosuppressants

3. Diabetes & Endocrine Medicine

Common and / or Important Diabetes Problems:

- Diabetic ketoacidosis
- Non-acidotic hyperosmolar coma / severe hyperglycaemia
- Hypoglycaemia
- Care of the acutely ill diabetic
- Peri-operative diabetes care

Common or Important Endocrine Problems:

- Hyper/Hypocalcaemia
- Adrenocortical insufficiency
- Hyper/Hyponatraemia
- Thyroid dysfunction
- Dyslipidaemia

- Endocrine emergencies: myxoedemic coma, thyrotoxic crisis, Addisonian crisis, hypopituitary coma, phaeochromocytoma crisis

Clinical Science:

- Outline the function, receptors, action, secondary messengers and feedback of hormones
- Pharmacology of major drug classes: insulin, oral anti-diabetics, thyroxine, anti-thyroid drugs, corticosteroids, sex hormones, drugs affecting bone metabolism

4. Gastroenterology and Hepatology

Common or Important Problems:

- Peptic Ulceration and Gastritis
- Gastroenteritis
- GI malignancy (oesophagus, gastric, hepatic, pancreatic, colonic)
- Inflammatory bowel disease
- Iron Deficiency anaemia
- Acute GI bleeding
- Acute abdominal pathologies: pancreatitis, cholecystitis, appendicitis, leaking abdominal aortic aneurysm
- Functional disease: irritable bowel syndrome, non-ulcer dyspepsia
- Coeliac disease
- Alcoholic liver disease
- Alcohol withdrawal syndrome
- Acute liver dysfunction: jaundice, ascites, encephalopathy
- Liver cirrhosis
- Gastro-oesophageal reflux disease
- Nutrition: indications, contraindications and ethical dilemmas of nasogastric feeding and EG tubes, IV nutrition, re-feeding syndrome
- Gall stones
- Viral hepatitis
- Auto-immune liver disease
- Pancreatic cancer

Clinical Science:

- Laboratory markers of liver, pancreas and gut dysfunction
- Pharmacology of major drug classes: acid suppressants, anti-spasmodics, laxatives, anti-diarrhoea drugs, aminosalicylates, corticosteroids, immunosuppressants, infliximab, pancreatic enzyme supplements

5. Renal Medicine

Common and / or Important Problems:

- Acute renal failure
- Chronic renal failure
- Glomerulonephritis
- Nephrotic syndrome
- Urinary tract infections
- Urinary Calculus
- Renal replacement therapy
- Disturbances of potassium, acid/base, and fluid balance (and appropriate acute interventions)

Clinical Science:

- Measurement of renal function
- Metabolic perturbations of acute, chronic, and end-stage renal failure and associated treatments

6. Respiratory Medicine

Common and / or Important Respiratory Problems:

- COPD
- Asthma
- Pneumonia
- Pleural disease: Pneumothorax, pleural effusion, mesothelioma
- Lung Cancer
- Respiratory failure and methods of respiratory support
- Pulmonary embolism and DVT
- Tuberculosis
- Interstitial lung disease
- Bronchiectasis
- Respiratory failure and cor-pulmonale
- Pulmonary hypertension

Clinical Science:

- Principles of lung function measurement
- Pharmacology of major drug classes: bronchodilators, inhaled corticosteroids, leukotriene receptor antagonists, immunosuppressants

7. Allergy

Common or Important Allergy Problems

- Anaphylaxis
- Recognition of common allergies; introducing occupation associated allergies
- Food, drug, latex, insect venom allergies
- Urticaria and angioedema

Clinical Science

- Mechanisms of allergic sensitization: primary and secondary prophylaxis
- Natural history of allergic diseases
- Mechanisms of action of anti-allergic drugs and immunotherapy
- Principles and limitations of allergen avoidance

8. Haematology

Common and / or Important Problems:

- Bone marrow failure: causes and complications
- Bleeding disorders: DIC, haemophilia
- Thrombocytopaenia
- Anticoagulation treatment: indications, monitoring, management of over-treatment
- Transfusion reactions
- Anaemia: iron deficient, megaloblastic, haemolysis, sickle cell,
- Thrombophilia: classification; indications and implications of screening
- Haemolytic disease
- Myelodysplastic syndromes
- Leukaemia
- Lymphoma
- Myeloma
- Myeloproliferative disease
- Inherited disorders of haemoglobin (sickle cell disease, thalassaemias)
- Amyloid

Clinical Science:

- Structure and function of blood, reticuloendothelial system, erythropoietic tissues

9. Immunology

Common or Important Problems:

- Anaphylaxis (see also 'Allergy')

Clinical Science:

- Innate and adaptive immune responses
- Principles of Hypersensitivity and transplantation

10. Infectious Diseases

Common and / or Important Problems:

- Fever of Unknown origin
- Complications of sepsis: shock, DIC, ARDS
- Common community acquired infection: LRTI, UTI, skin and soft tissue infections, viral exanthema, gastroenteritis
- CNS infection: meningitis, encephalitis, brain abscess
- HIV and AIDS including ethical considerations of testing
- Infections in immuno-compromised host
- Tuberculosis
- Anti-microbial drug monitoring
- Endocarditis
- Common genito-urinary conditions: non-gonococcal urethritis, gonorrhoea, syphilis

Clinical Science:

- Principles of vaccination
- Pharmacology of major drug classes: penicillins, cephalosporins, tetracyclines, aminoglycosides, macrolides, sulphonamides, quinolones, metronidazole, anti-tuberculous drugs, anti-fungals, anti-malarials, anti-helminthics, anti-virals

11. Medicine in the Elderly

Common or Important Problems:

- Deterioration in mobility
- Acute confusion
- Stroke and transient ischaemic attack
- Falls
- Age related pharmacology
- Hypothermia
- Continence problems
- Dementia
- Movement disorders including Parkinson's disease
- Depression in the elderly
- Osteoporosis
- Malnutrition
- Osteoarthritis

Clinical Science:

- Effects of ageing on the major organ systems
- Normal laboratory values in older people

12. Musculoskeletal System

Common or Important Problems:

- Septic arthritis
- Rheumatoid arthritis
- Osteoarthritis
- Seronegative arthritides
- Crystal arthropathy
- Osteoporosis – risk factors, and primary and secondary prevention of complications of osteoporosis
- Polymyalgia and temporal arteritis
- Acute connective tissue disease: systemic lupus erythematosus, scleroderma, poly- and dermatomyositis, Sjogren's syndrome, vasculitides

Clinical Science:

- Pharmacology of major drug classes: NSAIDS, corticosteroids, immunosuppressants, colchicines, allopurinol, bisphosphonates

13. Neurology

Common or Important Problems:

- Acute new headache
- Stroke and transient ischaemic attack
- Subarachnoid haemorrhage
- Coma
- Central Nervous System infection: encephalitis, meningitis, brain abscess
- Raised intra-cranial pressure
- Sudden loss of consciousness including seizure disorders (see also above syncope etc)
- Acute paralysis: Guillian-Barré, myasthenia gravis, spinal cord lesion
- Multiple sclerosis
- Motor neuron disease

Clinical Science:

- Pathophysiology of pain, speech and language
- Pharmacology of major drug classes: anxiolytics, hypnotics inc. benzodiazepines, antiepileptics, anti-Parkinson's drugs (anti-muscarinics, dopaminergics)

14. Psychiatry

Common and /or Important Problems:

- Suicide and parasuicide
- Acute psychosis
- Substance dependence
- Depression

Clinical Science:

- Principles of substance addiction, and tolerance
- Pharmacology of major drug classes: anti-psychotics, lithium, tricyclic antidepressants, mono-amine oxidase inhibitors, SSRIs, venlafaxine, donepezil, drugs used in treatment of addiction (bupropion, disulpharam, acamprosate, methadone)

15. Cancer and Palliative Care

Common or Important Oncology Problems:

- Hypercalcaemia
- SVC obstruction
- Spinal cord compression
- Neutropenic sepsis
- Common cancers (presentation, diagnosis, staging, treatment principles): lung, bowel, breast, prostate, stomach, oesophagus, bladder)

Common or Important Palliative Care Problems:

- Pain: appropriate use, analgesic ladder, side effects, role of radiotherapy
- Constipation
- Breathlessness
- Nausea and vomiting
- Anxiety and depressed mood

Clinical Science:

- Principles of oncogenesis and metastatic spread
- Apoptosis
- Principles of staging
- Principles of screening
- Pharmacology of major drug classes in palliative care: anti-emetics, opioids, NSAIDS, agents for neuropathic pain, bisphosphonates, laxatives, anxiolytics

16. Clinical Genetics

Common and / or Important problems:

- Down's syndrome
- Turner's syndrome
- Huntington's disease
- Haemochromatosis
- Marfan's syndrome
- Klinefelter's syndrome
- Familial cancer syndromes
- Familial cardiovascular disorders

Clinical Science:

- Structure and function of human cells, chromosomes, DNA, RNA and cellular proteins
- Principles of inheritance: Mendelian, sex-linked, mitochondrial
- Principles of pharmacogenetics
- Principles of mutation, polymorphism, trinucleotide repeat disorders
- Principles of genetic testing including metabolite assays, clinical examination and analysis of nucleic acid (e.g. PCR)

17. Clinical Pharmacology

Common and / or Important problems:

- Corticosteroid treatment: short and long-term complications, bone protection, safe withdrawal of corticosteroids, patient counselling regarding avoid adrenal crises
- Specific treatment of poisoning with:
    - Aspirin,
    - Paracetamol
    - Tricyclic anti-depressants
    - Beta-blockers
    - Carbon monoxide
    - Opiates
        - Digoxin
        - Benzodiazepines

Clinical Science:

- Drug actions at receptor and intracellular level
- Principles of absorption, distribution, metabolism and excretion of drugs
- Effects of genetics on drug metabolism
- Pharmacological principles of drug interaction
- Outline the effects on drug metabolism of: pregnancy, age, renal and liver impairment

Investigation Competencies

Outline the Indications for, and Interpret the Following Investigations:

- Basic blood biochemistry: urea and electrolytes, liver function tests, bone biochemistry, glucose, magnesium
- Cardiac biomarkers and cardiac-specific troponin
- Creatine kinase
- Thyroid function tests
- Inflammatory markers: CRP / ESR
- Arterial Blood Gas analysis
- Cortisol and short Synacthen test
- HbA1C
- Lipid profile
- Amylase
- Drug levels: paracetamol, salicylate, digoxin, antibiotics, anti-convulsants
- Full blood count
- Coagulation screen
- Haemolysis screen
- D dimer
- Blood film report
- Haematinics
- Blood / Sputum / urine culture
- Fluid analysis: pleural, cerebro-spinal fluid, ascitic
- Urinalysis and urine microscopy
- Auto-antibodies
- H. Pylori testing
- Chest radiograph
- Abdominal radiograph
- Joint radiographs (knee, hip, hands, shoulder, elbow, dorsal spine, ankle)
- ECG
- Peak flow tests
- Full lung function tests

More Advanced Competencies;

- Urine catecholamines
- Sex hormones (FSH, LH, testosterone, oestrogen and progesterone) & Prolactin
- Specialist endocrine suppression or stimulation tests (dexamethasone suppression test; insulin tolerance test; water deprivation test, glucose tolerance test and growth hormone)
- Coeliac serology screening
- Viral hepatitis serology
- Myeloma screen
- Stool testing
- HIV testing
- Ultrasound
- Detailed imaging: Barium studies, CT, CT pulmonary angiography, high resolution CT, MRI
- Imaging in endocrinology (thyroid, pituitary, adrenal)
- Renal imaging: ultrasound, KUB, IVU, CT
- Echocardiogram
- 24 hour ECG monitoring
- Ambulatory blood pressure monitoring
- Exercise tolerance test
- Cardiac perfusion scintigraphy
- Tilt testing
- Neurophysiological studies: EMG, nerve conduction studies, visual and auditory evoked potentials
- Bone scan
- Bone densitometry
- Scintigraphy in endocrinology
- V/Q scanning

Procedural Competencies

- The trainee is expected to be competent in performing the following procedures by the end of core training. The trainee must be able to outline the indications for these interventions. For invasive procedures, the trainee must recognize the indications for the procedure, the importance of valid consent, aseptic technique, safe use of local anaesthetics and minimization of patient discomfort.

- Venepuncture
- Cannula insertion, including large bore
- Arterial blood gas sampling
- Lumbar Puncture
- Pleural tap and aspiration
- Intercostal drain insertion: Seldinger technique
- Ascitic tap
- Abdominal paracentesis
- Central venous cannulation
- Initial airway protection: chin lift, Guedel airway, nasal airway, laryngeal mask
- Basic and, subsequently, advanced cardiorespiratory resuscitation
- Bronchoscopy
- Upper and lower GI endoscopy
- ERCP
- Liver biopsy
- Renal biopsy
- Bone marrow and lymph node biopsy
- Cytology: pleural fluid, ascitic fluid, cerebro-spinal fluid, sputem
- DC cardioversion
- Urethral catheterization
- Nasogastric tube placement and checking
- Electrocardiogram
- Knee aspiration
- Temporary cardiac pacing by internal wire or external pacemaker
- Skin Biopsy (this is not mandated for all trainees but opportunities to become competent in this technique should be available especially for trainees who subsequently wish to undertake specialist dermatology training)

Specialty training in Endocrinology

SPECIFIC PROGRAM CONTENT

1. Pediatric Endocrinology including Diabetes and Metabolism

Objectives
1. To learn the approach to diagnosis and treatment of disorders affecting children with emphasis on those endocrinologic disorders affecting growth and development, sexual differentiation, and pubertal maturation.
2. To gain experience in dealing with parents of children with diabetes mellitus or endocrine disorders.
3. To gain experience in the evaluation and management of children with diabetes mellitus and in their diabetes education.

Duration
A minimum of two months. Further experience will be arranged depending on the interests and career goals of the resident.

Resources
Pediatric Diabetes and Endocrine Clinic and Inpatient Service

2. Genetics

Objectives
To become familiar with
1. The methods of genetic analysis
2. Genetic counseling of patients and their families
3. Ethical issues associated with genetic analysis and counseling

Duration
A minimum of two weeks. Further experience will be arranged depending on the interests and career goals of the Fellow.

3. Nuclear medicine/Endocrine Imaging

4. Diabetes Mellitus

Type 1 and Type 2 diabetes mellitus, including;

1. Patient monitoring and treatment objectives in adolescents and adults
2. Acute and chronic complications, including
3. Diabetic ketoacidosis
4. Hyperosmolar non-ketotic syndromes
5. Hypoglycemia
6. Microvascular and macrovascular disease including;
    i) Diabetic retinopathy
    ii) Diabetic nephropathy
    iii) Diabetic neuropathy
    iv) Dermatologic aspects of diabetes
    v) Coronary heart disease
    vi) Peripheral vascular disease
    vii) Cerebral vascular disease
7. Infections in the diabetic patient
8. Gestational diabetes mellitus
9. Diabetes mellitus in the pregnant patient
10. The surgical patient with diabetes mellitus
11. Patient education
12. Psychosocial issues
13. Genetics and genetic counseling as it relates to patients with endocrine and metabolism disorders
14. Dietary principle

Technical and Other Skills

1. Management of adolescent and adult patients of all ages with diabetes mellitus, including but not limited to the following aspects of the disease:
2. The utilization and interpretation of autoimmune markers of Type 1 diabetes in patient management and counseling
3. Prescription of exercise programs
4. Rationale for and calculation of diabetic diets
5. Oral antidiabetic therapy
6. The use of intravenous insulin in acute decompensated diabetes mellitus

7. Chronic insulin administration, including the use of all varieties of insulin delivery systems
8. Hyperinsulinemic euglycemic hypoglycemic and hyperglycemic clamps
9. Glucose Tolerance Test
10. Glucose monitoring devices
11. Fundoscopic examination, recognition, and appropriate referral of patients with diabetic retinopathy
12. Foot care
13. Psychosocial effects of diabetes mellitus on patients and their families
14. Patient and community education

1. Hypothalamus/ Pituitary

a. Hypothalamic insufficiency
b. Hypothalamic and pituitary tumors, including; pituitary tumors of all types, with particular experience in the diagnosis and management of prolactinoma, acromegaly, Cushing's disease, and clinically non-functioning tumors, craniopharyngioma and other space occupying and infiltrative disorders of the pituitary and hypothalamic region

Anterior pituitary disorders:

a. Regulation of the pituitary axis
b. Hypo and Hyperpituitarism
c. Growth hormone disorders
d. Prolactin

e. ACTH axis: Cushing's disease
f. Gonadotrophins: Hypogonadotrophic hypogonadism

Posterior Pituitary disorders:

a. SIADH
b. Diabetes insipidus (primary and nephrogenic)
c. Galactorrhea

Technical and Other Skills

1. Water deprivation test
2. Insulin tolerance test
3. Test for GH deficiency
4. Dexamethasone suppression test
5. Glucose tolerance test for acromegaly
6. Visual field testing
7. Pituitary imaging

2. **Reproductive Endocrinology**

Objectives

To gain experience with disorders of reproductive endocrinology and endocrinologic aspects of sexual dysfunction

Reproductive Endocrinology of Female:

a. Polycystic ovarian syndrome
b. Hirsutism /virilization
c. Female infertility
d. Premature ovarian failure
e. Menstrual disorders
f. Dysfunctional uterine bleeding
g. Menopause
h. Contraception and hormone replacement therapy
i. Ovarian tumors

Technical and Other Skills

1. Screening for ovulation
2. Pelvic and trans-vaginal ultrasound
3. Ovulation induction
4. Laparoscopic
5. Treatment of infertility

Reproductive Endocrinology of Male:

a. Testicular physiology
b. Male hypogonadism
c. Male infertility
d. Gynaecomastia
e. Erectile dysfunction
f. Testicular tumors
g. Autoimmune Polyglandular Failure Syndrome
h. Androgen replacement therapy

Technical and Other Skills

1. Testicular biopsy
2. Induction of fertility in hypogonadotrophic hypogonadism
3. SMR

Disorder of sexual differentiation

a. Hormonal evaluation
b. Androgen insensitivity syndrome
c. True hermaphroditism
d. Gender assignment strategies

3. Thyroid

Thyroid disorders, including

a. Hyperthyroidism and hypothyroidism
b. Nodular thyroid diseases
c. Thyroid cancer
d. Goiter
e. Thyroiditis, including chronic, silent, subacute, and autoimmune

Technical and Other Skills

1. Performance and cytologic interpretation of fine needle aspiration of the thyroid
2. Thyroid scanning
3. B Scanning for thyroid
4. Assessment of Thyroid Ophthalmopathy

4. Parathyroid Glands/Calcium/Bone/Magnesium/Phosphorus

a. Disorders of bone and mineral metabolism, including; Hyperparathyroidism and other causes of hypercalcemia
b. Hypoparathyroidism and other causes of hypocalcemia
c. Mineral and bone homeostasis
d. Hormone regulators of mineral homeostasis
e. Metabolic bone diseases, with particular emphasis on the diagnosis and management of osteoporosis
f. Evaluation and prevention of kidney stones
g. Paget's disease
h. Osteomalacia, rickets and disorders of vitamin D metabolism
i. Disorders of magnesium and phosphorus metabolism
j. Calcitonin and medullary thyroid carcinoma
k. Bone tumors

Technical and Other Skills

1. Indication and interpretation of quantitative digital radiography and other tests used in the management of osteoporosis and other metabolic bone diseases
2. CT based Calcium scoring
3. MBI scanning
4. Dual Energy X-ray Absorbimetry
5. DEXA scanning

5. Adrenal Gland

1. Benign and malignant adrenal tumors
2. Adrenogenital syndromes

Diseases of Adrenal Cortex

a. Adrenal hyperfunction
b. Syndrome of glucocorticoid excess
c. Cushing's syndrome
d. Mineralocorticoid excess
e. Adrenal hypofunction

Diseases of Adrenal Medulla

a. Catecholamine biosynthesis and metabolism
b. Phaeochromocytomas
c. Adrenal "incidentaloma"

Technical and Other Skills

1. Test of adreno-cortical function
2. Short and long synacthen test
3. Post operative management of adrenal tumors
4. Selective adrenal venous sampling for aldosterone
5. MIBG scan
6. Management of suspected phaeochromocytoma
7. Clonidine suppression test

6. Endocrine Emergencies, including

a. Hypercalcemia and hypocalcemia
b. Severe hypo- and hyperthyroidism
c. Adrenal insufficiency
d. Pituitary apoplexy

Hormone-producing neoplasms, particularly carcinoid syndromes, ectopic hormone production, islet cell tumors and multiple endocrine neoplasia syndromes

1. Endocrinology of the Gastrointestinal System

a. Gut hormones and incretins
b. Carcinoid syndrome
c. Islet cell tumors

Technical and Other Skills

1. Localisation of gut tumors
2. Secretin test

2. Nutrition/ Water, Electrolyte & Acid-Base Disorders

1. Protein energy malnutrition
2. The eating disorders
3. Obesity; pathophysiology, diagnosis and management
4. Anorexia nervosa and bulimia
5. Vitamin and mineral deficiency and excess
6. Micronutrients
7. Disorders of fluid, electrolyte, and acid-base metabolism, including;
    - Hypernatremia and hyponatremia
    - Hyperkalemia and hypokalemia
    - Metabolic acidosis
    - Metabolic alkalosis
    - Parenteral nutritional support nutritional disorders

Technical and Other Skills

1. Nutritional assessment
2. Enteral and parenteral nutrition designing

3. Lipids/ Metabolic Disorders

a. Hypoglycemic syndromes, including the spectrum of insulinoma and other causes
b. The diagnosis and management of lipid and lipoprotein disorders
c. Inborn errors of amino acid metabolism
d. The diagnosis and management of primary and secondary hypertension
e. Disorders of porphyrins and metals

f. Inherited disorders of connective tissue

4 . Endocrine aspects of Aging/Psychiatric/Systemic Disorders

1. Endocrine aspects of psychiatric diseases
2. Endocrine aspects of aging, with particular emphasis on the care of geriatric patients with endocrine disease and diabetes and the endocrine changes associated with aging.

3. Endocrine adaptations and maladaptations to systemic diseases, including effects on the thyroidal, adrenal, and gonadal axes.
4. The effects of a variety of non-endocrine disorders on laboratory and imaging studies and performance and interpretation of stimulation and suppression tests.

RESEARCH/ THESIS WRITING

Total of one year will be allocated for work on a research project with thesis writing. Project must be completed and thesis be submitted by the end of training. Research can be done as one block in 5th year of training or it can be stretched over five years of training in the form of regular periodic rotations during the course as long as total research time is equivalent to one calendar year.

Research

The active research component program must ensure meaningful, supervised research experience with appropriate protected time for each resident while maintaining the essential clinical experience. Recent productivity by the program faculty and by the residents will be required, including publications in peer-reviewed journals. Residents must learn the design and interpretation of research studies, responsible use of informed

consent, and research methodology and interpretation of data. The program must provide instruction in the critical assessment of new therapies and of the medical literature. Residents should be advised and supervised by qualified staff members in the conduct of research.

Clinical Experience

1. The training program must provide opportunities for the resident to develop clinical competence in the field of endocrinology, diabetes and metabolism. Clinical experience must include opportunities to diagnose and manage inpatients and outpatients of all ages and both sexes and representing variable acuity who have a wide variety of endocrine and metabolic diseases. The program must also include opportunities to function in the role of an endocrinology consultant for other physicians and services in both inpatient and outpatient settings.

2. The residents must be given opportunities to assume responsibility for and follow patients throughout the training period in both inpatient and outpatient settings in order to observe the evolution and natural history of these disorders as well as the effectiveness of therapeutic interventions. To accomplish these goals, the educational program must include, on average, a minimum of two half-days each week in ambulatory care. Residents must have experience with patients who have diabetes, as well as thyroid, neuroendocrine, reproductive and metabolic bone diseases and other general endocrine problems
3. The curriculum must emphasize biochemistry and physiology, including cell and molecular biology, as they relate to endocrinology, diabetes and metabolism. The appropriate utilization and the interpretation of clinical laboratory, radionuclide and radiologic studies for the diagnosis and treatment of endocrine and metabolic diseases must be stressed.
4. Residents must have clinical experience in a multidisciplinary diabetes education and treatment program.
5. Residents must have formal instruction, clinical experience or opportunities to acquire expertise in the evaluation and management of endocrinological disorders

Research Experience

Clinical Research

Each resident will participate in at least one clinical research study to become familiar with:

1. Research design
2. Research involving human subjects including informed consent and operations of the Institutional Review Board and ethics of human experimentation
3. Data collection and data analysis
4. Research ethics and honesty
5. Peer review process

This usually is done during the consultation and outpatient clinic rotations.

Case Studies or Literature Reviews

Each resident will write, and submit for publication in a peer-reviewed journal, a case study or literature review on a topic of his/her choice.

Laboratory Research

Bench Research

Participation in laboratory research is at the option of the resident and may be arranged through any faculty member of the Division. When appropriate, the research may be done at other institutions.

Hormone assays

Each resident will observe and become familiar with current methods of hormone assays including radioimmuno- and immunoradiometric assays.

Research involving animals

Each resident participating in research involving animals is required to:

1. Become familiar with the pertinent Rules and Regulations of the University of Health Sciences Lahore i.e. those relating to "Health and Medical Surveillance Program for Laboratory Animal Care Personnel" and "Care and Use of Vertebrate Animals as Subjects in Research and Teaching"
2. Read the "Guide for the Care and Use of Laboratory Animals"
3. View the videotape of the symposium on Humane Animal Care

Research involving Radioactivity

Each resident participating in research involving radioactive materials is required to

1. Attend a Radiation Review session
2. Work with an Authorized User and receive appropriate instruction from him/her.

METHODS OF INSTRUCTION/COURSE CONDUCTION

As a policy, active participation of students at all levels will be encouraged. Following teaching modalities will be employed:

1. Lectures
2. Seminar Presentation and Journal Club Presentations
3. Group Discussions
4. Grand Rounds
5. Clinico-pathological Conferences
6. SEQ as assignments on the content areas
7. Skill teaching in ICU, emergency and ward settings
8. Attend genetic clinics and rounds for at least one month.
9. Attend sessions of genetic counseling
10. Self study, assignments and use of internet
11. Bedside teaching rounds in ward
12. OPD & Follow up clinics
13. Long and short case presentations

In addition to the conventional teaching methodologies interactive strategies like conferences will also be introduced to improve both communication and clinical skills in the upcoming consultants. Conferences must be conducted

regularly as scheduled and attended by all available faculty and residents. Residents must actively request autopsies and participate in formal review of gross and microscopic pathological material from patients who have been under their care. It is essential that residents participate in planning and in conducting conferences.

1. Clinical Case Conference

Each resident will be responsible for at least one clinical case conference each month. The cases discussed may be those seen on either the consultation or clinic service or during rotations in specialty areas. The resident, with the advice of the Attending Physician on the Consultation Service, will prepare and present the case(s) and review the relevant literature.

2. Monthly Student Meetings

Each affiliated medical college approved to conduct training for MD Endocrinology will provide a room for student meetings/discussions such as:

a. Journal Club Meeting
b. Core Curriculum Meetings
c. Skill Development

a. Journal Club Meeting

A resident will be assigned to present, in depth, a research article or topic of his/her choice of actual or potential broad interest and/or application. Two hours per month should be allocated to discussion of any current articles or topics introduced by any participant. Faculty or outside researchers will be invited to present outlines or results of current research activities. The article should be critically evaluated and its applicable results should be highlighted, which can be incorporated in clinical practice. Record of all such articles should be maintained in the relevant department.

b. Core Curriculum Meetings

All the core topics of Endocrinology should be thoroughly discussed during these sessions. The duration of each session should be at least two hours once a month. It should be chaired by the chief resident (elected by the residents of the relevant discipline). Each resident should be given an opportunity to brainstorm all topics included in the course and to generate new ideas regarding the improvement of the course structure

c. Skill Development

Two hours twice a month should be assigned for learning and practicing clinical skills.

List of skills to be learnt during these sessions is as follows:

1. Residents must develop a comprehensive understanding of the indications, contraindications, limitations, complications, techniques, and interpretation of results of those technical procedures integral to the discipline (mentioned in the Log Book).
2. Residents must acquire knowledge of and skill in educating patients about the technique, rationale and ramifications of procedures and in obtaining procedure-specific informed consent. Faculty supervision of residents in their performance is required, and each resident's experience in such procedures must be documented by the program director.
3. Residents must have instruction in the evaluation of medical literature, clinical epidemiology, clinical study design, relative and absolute risks of disease, medical statistics and medical decision-making.
4. Training must include cultural, social, family, behavioral and economic issues, such as confidentiality of information, indications for life support systems, and allocation of limited resources.
5. Residents must be taught the social and economic impact of their decisions on patients, the primary care physician and society. This can be achieved by attending the bioethics lectures and becoming familiar with Project Professionalism Manual such as that of the American Board of Internal Medicine.
6. Residents should have instruction and experience with patient counseling skills and community education.

7. This training should emphasize effective communication techniques for diverse populations, as well as organizational resources useful for patient and community education.
8. Each resident should attend at least one series of classes given to patients with diabetes mellitus and at least two counseling sessions in the Nutrition Clinic for patients with diabetes mellitus, obesity or lipid disorders.
9. Residents may attend the series of lectures on Nuclear Medicine procedures (radionuclide scanning and localization tests and therapy) presented to the Radiology residents.
10. Each resident will observe and participate in each of the following procedures, preferably done on patients under his/her care including thyroid uptake and scanning; total body scan for thyroid cancer; ultrasound of the thyroid, DEXA scans, central and peripheral and other imaging procedures for endocrine problems.
11. Residents should have experience in the performance of endocrine clinical laboratory and radionuclide studies and basic laboratory techniques, including quality control, quality assurance and proficiency standards.

3. Annual Grand Meeting

Once a year all residents enrolled for MD Endocrinology should be invited to the annual meeting at UHS Lahore.
One full day will be allocated to this event. All the chief residents from affiliated institutes will present their annual reports. Issues and concerns related to their relevant courses will be discussed. Feedback should be collected and suggestions should be sought in order to involve residents in decision making.
The research work done by residents and their literary work may be displayed.
In the evening an informal gathering and dinner can be arranged. This will help in creating a sense of belonging and ownership among students and the faculty.

LOG BOOK

The residents must maintain a log book and get it signed regularly by the supervisor. A complete and duly certified log book should be part of the requirement to sit for MD examination. Log book should include adequate number of diagnostic and therapeutic procedures observed and performed, the indications for the procedure, any complications and the interpretation of the results, routine and emergency management of patients, case presentations in CPCs, journal club meetings and literature review.

Proposed Format of Log Book is as follows:

Candidate's Name: ----------

Supervisor ----------

Roll No. ----------

The procedures shall be entered in the log book as per format

Residents should become proficient in performing the related procedures. After observing the technique, they will be observed while performing the procedure and, when deemed competent by the supervising physician, will perform it independently. They will be responsible for obtaining informed consent, performing the procedure, reviewing the results with the pathologist and the attending physician and informing the patient and, where appropriate, the referring physician of the results.

Procedures Performed

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Diagnosis	Procedure Performed	Supervisor's Signature
1					
2					
3					
4					

Endocrine Emergencies Handled

Sr. #	Date	Name of Patient, Age, Sex & Admission No.	Diagnosis	Procedure/ Management	Supervisor's Signature
1					
2					
3					
4					

Case Presented

Sr.#	Date	Name of Patient, Age, Sex & Admission No.	Case Presented	Supervisor's Signature
1				
2				
3				
4				

Seminar/Journal Club Presentation

Sr.#	Date	Topic	Supervisor's Signature
1			
2			
3			
4			

Evaluation Record
(Excellent, Good, Adequate, Inadequate, Poor)

At the end of the rotation, each faculty member will provide an evaluation of the clinical performance of the fellow.

Sr.#	Date	Method of Evaluation (Oral, Practical, Theory)	Rating	Supervisor's Signature
1				
2				

EVALUATION & ASSESSMENT STRATEGIES

Assessment

It will consist of action and professional growth oriented ***student-centered integrated assessment*** with an additional component of ***informal internal assessment***, ***formative assessment*** and measurement-based ***summative assessment*****.**

Student-Centered Integrated Assessment

It views students as decision-makers in need of information about their own performance. Integrated Assessment is meant to give students responsibility for deciding what to evaluate, as well as how to evaluate it, encourages students to **'own'** the evaluation and to use it as a basis for self-improvement. Therefore, it tends to be growth-oriented, student-controlled, collaborative, dynamic, contextualized, informal, flexible and action-oriented.

In the proposed curriculum, it will be based on:

- Self Assessment by the student
- Peer Assessment
- Informal Internal Assessment by the Faculty

Self Assessment by the Student

Each student will be provided with a pre-designed self-assessment form to evaluate his/her level of comfort and competency in dealing with different relevant clinical situations. It will be the responsibility of the student to correctly identify his/her areas of weakness and to take appropriate measures to address those weaknesses.

Peer Assessment

The students will also be expected to evaluate their peers after the monthly small group meeting. These should be followed by a constructive feedback

according to the prescribed guidelines and should be non-judgmental in nature. This will enable students to become good mentors in future.

Informal Internal Assessment by the Faculty

There will be no formal allocation of marks for the component of Internal Assessment so that students are willing to confront their weaknesses rather than hiding them from their instructors.

It will include:

- **a.** Punctuality
- **b.** Ward work
- **c.** Monthly assessment (written tests to indicate particular areas of weaknesses)
- **d.** Participation in interactive sessions

Formative Assessment

Will help to improve the existing instructional methods and the curriculum in use

Feedback to the faculty by the students:

After every three months students will be providing a written feedback regarding their course components and teaching methods. This will help to identify strengths and weaknesses of the relevant course, faculty members and to ascertain areas for further improvement.

Summative Assessment

It will be carried out at the end of the programme to empirically evaluate **cognitive, psychomotor** and **affective domains** in order to award degrees for successful completion of courses.

MD ENDOCRINOLOGY EXAMINATIONS

Intermediate Examination MD Endocrinology
Total Marks: 500

All candidates admitted in MD Endocrinology course shall appear in Intermediate examination at the end of 2nd calendar year.

There shall be one written paper of 300 marks, clinical TOACS/OSCE & ORAL of 200 marks.

At the end of 2nd year M.D. Endocrinology Programme

Written Examination	=	300 Marks
Clinical, TOACS/OSCE & ORAL	=	200 Marks
Total	=	500 Marks

Written Paper	**=**	**300 Marks**
MCQs	=	100 (2 Marks each MCQ)
SEQs	=	10 (10 Marks each SEQ)
Clinical, TOACS/OSCE & ORAL	**=**	**Total Marks 200**
a) 4 short Cases	=	100 marks
b) Long Case	=	50 marks
c) TOACS/OSCE & ORAL	=	50 marks

Written Paper

Principles Internal Medicine	=	70 MCQs	7 SEQs
Specialty	=	10 MCQs	1 SEQ
Basic Sciences	=	20 MCQs	2 SEQs
Physiology	=	8 MCQs	1 SEQ
Pharmacology	=	4 MCQs	-------
Pathology	=	8 MCQs	1 SEQ

Final Examination of MD Endocrinology
Total Marks: 1500

All candidates admitted in MD course shall appear in Final examination at the end of structured training programme (end of 5th calendar year) and after clearing Intermediate examination.

There shall be two written papers of 250 marks each, Clinical TOACS/OSCE & ORAL of 500 marks, Internal assessment of 100 marks and thesis examination of 400 marks.

Topics included in paper 1

1. Pediatric Endocrinology (30 MCQs)
2. Diabetes Mellitus (20 MCQs)
3. Hypothalamus/ Pituitary (15 MCQs)
4. Genetics of endocrinology (15 MCQs)
5. Nuclear medicine/endocrine imaging (10 MCQs)
6. Endocrine aspects of Aging/Psychiatric /Systemic disorders (10MCQs)

Topics included in paper 2

1. Reproductive Endocrinology (20 MCQs)
2. Thyroid (15 MCQs)
3. Adrenal (15 MCQs)
4. Calcium/Bone/Magnesium/Phosphorus (15 MCQs)
5. Lipids/ Metabolic Disorders (15 MCQs)
6. GI Endocrinology (05 MCQs)
7. Nutrition clinic (10 MCQs)
8. Wound care clinic (05 MCQs)

Components of Final Examination

Theory

Paper I **250 Marks** **3 Hours**

05 SEQs	50 Marks
100 MCQs	200 Marks

Paper II **250 Marks** **3 Hours**

05 SEQs	05 Marks
100 MCQs	200 Marks

Only those candidates, who pass in theory papers, will be eligible to appear in the Clinical, TOACS/OSCE & ORAL.

Clinical, TOACS/OSCE & ORAL **500 Marks**

Four short cases	200 Marks
One long case:	100 Marks
TOACS/OSCE & ORAL	200 Marks

Continuous Internal Assessment **100 Marks**

Thesis Examination **400 Marks**

All candidates admitted in MD courses shall appear in thesis examination at the end of 5th calendar year of the MD programme. The examination shall include thesis evaluation with defense.

RECOMMENDED BOOKS

TEXTBOOKS

1. General Endocrinology by Wilson JD and Foster DW. Williams
2. Textbook of Endocrinology. WB Saunders Felig P, Baxter JD, Broadus AE and Frohman LA.
3. Endocrinology and Metabolism. McGraw-Hill.
4. Syllabus of Endocrine Society Postgraduate Assembly
5. Medical Knowledge Self-Assessment Program. American College of Physicians

Pediatric Endocrinology

1. Kaplan SA. Clinical Pediatric Endocrinology. WB Saunders

APPENDIX "E"

(See Regulation 9-iii)

MANDATORY WORKSHOPS

1. Each candidate of MD/MS/MDS program would attend the 04 mandatory workshops and any other workshop as required by the university.
2. The four mandatory workshops will include the following

   a. **Research Methodology and Biostatistics**
   b. **Synopsis Writing**
   c. **Communication Skills**
   d. **Introduction to Computer / Information Technology and Software programs**

3. The workshops will be held on 03 monthly basis.
4. An appropriate fee for each workshop will be charged.
5. Each workshop will be of 02 - 05 days duration.
6. Certificates of attendance will be issued upon satisfactory completion of workshops.

APPENDIX "F"
(See Regulation 9xxiii, 13, 14 & 16)

CONTINUOUS INTERNAL ASSESSMENTS

a) Workplace Based Assessments

Workplace based assessments will consist of Generic as well as Specialty Specific Competency Assessments and Multisource Feedback Evaluation.

Generic Competency Training & Assessments

The Candidates of all MD / MS / MDS programs will be trained and assessed in the following five generic competencies.

i. **Patient Care.**

a. Patient care competency will include skills of history taking, examination, diagnosis, plan of investigation, clinical judgment, plan of treatment, consent, counseling, plan of follow up, communication with patient / relatives and staff.

b. The candidate shall learn patient care through ward teaching, departmental conferences, morbidity and mortality meetings, core curriculum lectures and training in procedures and operations.

c. The candidate will be assessed by the supervisor during presentation of cases on clinical ward rounds, scenario based discussions on patient management, multisource feedback evaluation, Direct Observation of Procedures (DOPS) and operating room assessments.

d. These methods of assessments will have equal weightage.

ii. **Medical Knowledge and Research**

a. The candidate will learn basic factual knowledge of illnesses relevant to the specialty through lectures/discussions on topics selected from the syllabus, small group tutorials and bed side rounds.

b. The medical knowledge/skill will be assessed by the teacher during case based discussions and presentations to the supervisors /

c. The candidate will be trained in designing research project, data collection, data analysis and presentation of results by the supervisor.

d. The acquisition of research skill will be assessed as per regulations governing thesis evaluation and its acceptance.

iii. **Practice and System Based Learning**

a. This competency will be learnt from journal clubs, review of literature, policies and guidelines, audit projects, medical error investigation, root cause analysis and awareness of healthcare facilities.

b. The assessment methods will include case studies, presentation in morbidity and mortality review meetings and presentation of audit projects if any.

c. These methods of assessment shall have equal weight-age.

iv. **Communication Skills**

a. These will be learnt from role models, supervisor and workshops.

b. They will be assessed by direct observation of the candidate whilst interacting with the patients, relatives, colleagues and with multisource feedback evaluation.

v. **Professionalism as per Hippocratic Oath**

a. This competency is learnt from supervisor acting as a role model, ethical case conferences and lectures on ethical issues such as confidentiality, informed consent, end of life decisions, conflict of interest, harassment and use of human subjects in research.

b. The assessment of residents will be through multisource feedback evaluation according to proformas of evaluation and its' scoring method.

pecialty Specific Competencies

i. The candidates will be trained in operative and procedural skills according to a quarterly based schedule.

ii. The level of procedural competen
will be according to a competency table to be developed by each specialty.

iii. The following key will be used for assessing operative and procedural competencies:

a. **Level 1 Observer status**

The candidate physically present and observing the supervisor and senior colleagues

b. **Level 2 Assistant status**
The candidate assisting procedures and operations

c. **Level 3 Performed under supervision**
The candidate operating or performing a procedure under direct supervision

d. **Level 4 Performed independently**
The candidate operating or performing a procedure without any supervision

iv. **Procedure Based Assessments (PBA)**

a. Procedural competency will assess the skill of consent taking, preoperative preparation and planning, intraoperative general and specific tasks and postoperative management

b. Procedure Based assessments will be carried out during teaching and training of each procedure.

c. The assessors may be supervisors, consultant colleagues and senior residents.

d. The standardized forms will be filled in by the assessor after direct observation.

e. The resident's evaluation will be graded as satisfactory, deficient requiring further training and not assessed at all.

f. Assessment report will be sub

g. A satisfactory score will be required to be eligible for taking final examination.

Multisource Feedback Evaluation

i. The supervisor would ensure a multisource feedback to collect peer assessments in medical knowledge, clinical skills, communication skills, professionalism, integrity, and responsibility.

ii. Satisfactory annual reports will be required to become eligible for the final examination

b) Completion Of Candidate's Training Portfolio

i. The Candidate's Training Portfolio (CTP) will be published (or computer based portfolio downloadable) by the university.

ii. The candidates would either purchase the CTP or download it from the KEMU web site.

iii. The portfolio will consist of the following components

a) Enrollment details.

b) Candidate's credentials as submitted on the application for admission form.

c) Timeline of scheduled activities e.g dates of commencement and completion of training, submission of synopsis and thesis, assessments and examination dates etc **(Appendix H)**

d) Log Book of case presentations, operations and procedures recorded in an appropriate format and validated by the supervisor.

e) Record of participation and presentations in academic activities e.g lectures, workshops, journal clubs, clinical audit projects, morbidity & mortality review meetings, presentation in house as well as national and international meetings.

f) Record of Publications if any.

g) Record of results of assessments and examinations if any

h) Synopsis submission proforma and IRB proforma and AS&RB approval Letter

i) Copy of Synopsis as approved by AS&RB

iv. Candidates Training Portfolio shall be assessed as per proforma given in **"Appendix-G".**

pervisor's Annual Review Report.

This report will consist of the following components:-

i. Verification and validation of Log Book of operations & procedures according to the expected number of operations and procedures performed (as per levels of competence) determined by relevant board of studies.

ii. A 90 % attendance in academic activities is expected. The academic activities will include: Lectures, Workshops other than mandatory workshops, Journal Clubs, Morbidity & Mortality Review Meetings and Other presentations.

iii. Assessment report of presentations and lectures

iv. Compliance Report to meet timeline for completion of research project.

v. Compliance Report on Personal Development Plan.

vi. Multisource Feedback Report, on relationship with colleagues, patients.

vii. Supervisor will produce an annual report based on assessments as per proforma in appendix-G and submit it to the Examination Department.

viii. 75 % score will be required to pass the Continuous Internal Assessment on annual review.

APPENDIX " G "

(See Regulation 9ix, 9xxiii-d, 10, 11, 14 & 16)

Supervisor's Evaluation

PROFORMA FOR CONTINUOUS INTERNAL ASSESSMENTS

1.	**Generic Competencies**		
	(Please score from 1 – 100. 75% shall be the pass marks)	**Component Score**	**Score achieved**
	i. Patient Care	20	
	ii. Medical Knowledge and Research	20	
	iii. Practice and System Based Learning		
	• Journal Clubs	04	
	• Audit Projects	04	
	• Medical Error Investigation and Root Cause Analysis	04	
	• Morbidity / Mortality / Review meetings	04	
	• Awareness of Health Care Facilities	04	
	iv. Communication Skills		
	• Informed Consent	10	
	• End of life decisions	10	
	v. Professionalism		
	• Punctuality and time keeping	04	
	• Patient doctor relationship	04	
	• Relationship with colleagues	04	
	• Awareness of ethical issues	04	
	• Honesty and integrity	04	
2.	**Specialty specific competencies**		
	Please score from 1 – 100. 75% shall be the pass marks		**Score achieved**
	Operative Skills / Procedural Skills		
3.	**Multisource Feedback Evaluation**(Please score from 1 – 100. 75% shall be the pass marks)		
4.	**Candidates Training Portfolio** (Please score from 1 – 100.75% shall be the pass marks)		
	(Please score from 1 – 100. 75% shall be the pass marks)	**Component Score**	**Score achieved**
	i. Log book of operations and procedures	25	
	ii. Record of participation and presentation in academic activities	25	
	iii. Record of publications	25	
	iv. Record of results of assessments and examinations	25	