الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Anatomic Pathology


بسم الله الرحمن الرحيم

PREFACE

- The primary goal of this document is to enrich the training experience of postgraduate trainees by outlining the learning objectives to become independent and competent future practitioners.
- This curriculum may contain sections outlining some regulations of training; however, such regulations need to be sought from the training's "General Bylaws" and "Executive Policies," published by the Saudi Commission for Health Specialties (SCFHS), which can be accessed online through the official SCFHS website. In the case of a discrepancy in regulation statements, the one stated in the most updated bylaws and executive policies will be applied.
- As this curriculum is subject to periodic refinements, please refer to the electronic version posted online for the most updated edition at www.scfhs.org.sa

I. CONTRIBUTORS

This curriculum was prepared by the Specialty's Curriculum Development Committee:

- Dr. Turki Al Hussain
- Dr. Ahmed Al Humaidi
- Dr. Moayad Al Qazlan

Reviewed and approved by Anatomic Pathology Scientific Council Members:

- Dr. Shuaa Asiri
- Dr. Tahani Alhalouly
- Dr. Ahmed Alsayyah
- Dr. Wafa Alshakweer
- Dr. Fahad Alsufiani
- Dr. Fahad Alghamdi

Curriculum Review Committee Members were:

- Dr. Sakra Saleh Balhareth, Pharm.D., BCPS, BCACP
- Dr. Ali Alassiri, MBBS, Msc.MedEd. FRCSC, FACS

Previous versions' contributors list for anatomical pathology curriculum 2015:

- Prepared by the curriculum scientific group:
- Dr. Shamayel Mohammed,
- Dr. Wafa Alshaqweer,
- Dr. Hana Bamefleh, and
- Dr. Abdulrahim Alabdulsalam

Supervised by the curriculum specialists:
• Dr. Amin Zubair and • Dr. Sami Alshamarri
Reviewed and approved by the curriculum scientific council:
• Dr. Hisham Alkhaldi, • Dr. Dalal Altamimi, • Dr. Saeed Alsheiban, • Dr. Lulu Albahlal, • Dr. Ali Assawan, and • Dr. Shuaa Asiri
Approved by Head of Curriculum Review Committee:
• Dr. Ali Alassiri, MBBS, Msc.MedEd. FRCSC, FACS

II. COPYRIGHT STATEMENT

Correspondence: Saudi Commission for Health Specialties P.O. Box: 94656 Postal Code: 11614 Contact Center: 920019393

Email: curricula@scfhs.org.sa

Website: www.scfhs.org.sa

III. FORWARD

The Anatomic Pathology residency curriculum development team acknowledges the valuable contributions and feedback from scientific committee members in the development of this program.

We extend special appreciation and gratitude to all the members who have been pivotal in the completion of this booklet, especially the Curriculum Group, the Curriculum Specialists, and the Scientific Council.

We would also like to acknowledge that the CanMEDS framework is a copyright of the Royal College of Physicians and Surgeons of Canada, and many of the descriptions of competencies have been acquired from their resources.

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V. INTRODUCTION

1. Context of Practice

Pathology and laboratory medicine are among the major medical specialties. A certified specialist in this field is in charge of running and supervising a medical laboratory.

There is a clear national and international shortage of highly qualified pathologists. Moreover, there is ongoing, increasing demand for specialists in the field of pathology, particularly due to a revolution in medical services. The availability of a nationally certified and recognized program would encourage more graduates to specialize in this field.

The Anatomic Pathology Program was founded in 1987 in Saudi Arabia at King Saud University as a joint program of four institutions: King Khalid University Hospital (King Saud University), King Faisal Specialist Hospital & Research Centre, Prince Sultan Medical Military City (previously known as Riyadh Armed Forces Hospital), and King Abdulaziz Medical City for the National Guard (previously known as King Fahad National Guard Hospital).

Since 2007, the Saudi Commission for Health Specialties has provided a training program that leads to certification in the specialty of anatomic pathology.

The SCFHS runs pathology examinations as part of its residency training program. Success in these examinations and the required pre-examination training qualifies the medical graduate to practice as a consultant/specialist in the specialty of anatomic pathology.

To ensure adequate training, the scientific committee of the Saudi Board in Anatomic Pathology (SBAP) in the SCFHS offers advice, subject and sub-discipline outlines, mentoring, and training accreditation to assist graduates and their supervisors in meeting the large number of requirements needed to prepare for examinations.

This booklet provides medical graduates, current pathology trainees, and supervisors with information on the applications of pathology training, examinations, and qualification requirements.

2. Goals and Responsibilities of Curriculum Implementation

This curriculum ultimately seeks to guide trainees to become *competent* in their respective specialties. Accordingly, this goal requires a significant amount of effort and coordination from all stakeholders involved in postgraduate training. As *"adult learners,"* trainees must be proactive, fully engaged, and exhibit the following: a careful understanding of learning objectives, a desire to engage in self-directed learning and problem solving, an eagerness to apply learning by means of reflective practice from feedback and formative assessment, and self-awareness and willingness to ask for support when needed. The program director plays a vital role in ensuring the successful implementation of this curriculum. Moreover, training committee members, particularly the program administrator and chief resident, have a significant impact on program implementation. Trainees should be called to share responsibility in curriculum implementation. The Saudi Commission for Health Specialties (SCFHS) applies the best models of training governance to achieve the highest quality of training. Additionally, academic affairs in training centers and the regional supervisory training committee play a major role in training supervision and implementation. The Specialty Scientific Council ensures that the content of this curriculum is constantly updated to match the highest standards in postgraduate education for each trainee's specialty.

3. What is New in this Edition?

The current curriculum includes changes in the mandatory rotations for trainees in the program, as well as elective rotations. This edition also presents changes in formative assessment tools with the addition of research and logbooks for intraoperative consultation cases under skills.

VI. ABBREVIATIONS USED IN THIS DOCUMENT

Abbreviation	Description
SCFHS	Saudi Commission for Health Specialties
R(1)	(First) year of residency
PT	Progress test
OSCE	Objective Structured Clinical Examination
OSPE	Objective Structured Practical Examination
CBD	Case-Based Discussion report
ITER	In-Training Evaluation Report
RTC	Residency Training Committee
SBAP	Saudi Board in Anatomic Pathology

VII. PROGRAM ENTRY REQUIREMENTS

Graduates from the College of Medicine can apply for this training program according to the SCFHS policy on admission and registration.

Admission into the program is in accordance with the Commission Training Rules and Regulations.

Trainees shall abide by the training regulations and obligations established by the SCFHS.

Training is a full-time commitment. Residents shall be enrolled in full-time, continuous education for the entire duration of the program.

Training is to be conducted in institutions accredited for training by the Central Accreditation Committee and the SBAP.

Training shall be comprehensive and includes surgical pathology, cytology, electron microscopy, flow cytometry, cytogenetics/molecular pathology, and laboratory techniques.

Trainees shall be actively involved in working up patient specimens to make diagnoses with a gradual progression of responsibility.

Trainees shall be able to manage all kinds of surgical specimens and cytology samples according to set standards, from receiving to final reporting.

Trainees shall abide by all training regulations and obligations set out by the SCFHS.

VIII. LEARNING AND COMPETENCIES

1. Introduction to Learning Outcomes and Competency-Based Education

Training should be guided by well-defined "learning objectives" that are driven by targeted "learning outcomes" of a particular program to serve specific specialty needs. Learning outcomes are designed to reflect the professional "competencies" and tasks that are aimed to be "entrusted" to trainees upon graduation. This will ensure that graduates meet the expected demands of the health care system and patient care in relation to their particular specialty. Competency-based education (CBE) is an "adult-learning" approach that is based on achieving pre-defined, fine-grained, and well-paced learning objectives that are driven from complex professional competencies.

Professional competencies related to health care are usually complex and contain a mixture of multiple learning domains (knowledge, skills, and attitudes). CBE is expected to change the traditional method of postgraduate education. For instance, the training time, although a precious resource, should not be looked at as a proxy for *competence* (e.g., the number of rotation time hours in certain hospital areas is not the primary marker of competence achievement). Furthermore, CBE emphasizes the critical role of informed judgment of learners' competency progress, which is based on a staged and formative assessment that is driven by multiple workplace-based observations. Several CBE models have been developed for postgraduate education in healthcare (e.g., CanMED by the Royal College of Physicians and Surgeons of Canada (RCPSC), the CBME-Competency Model by the Accreditation Council for Graduate Medical Education (ACGME), and - others). The following are concepts that enhance the implementation of CBE in this curriculum:

- **Competency:** Competency is a cognitive construct that assesses the potential to perform efficiently in a given situation based on the standards of the profession. Professional roles (e.g., experts, advocates, communicators, leaders, scholars, collaborators, and professionals) are used to define competency role in order to make it amenable for learning and assessment.
- **Milestones:** Milestones are stages along the developmental journey throughout the competency continuum. Trainees throughout their learning journey, from junior and throughout senior levels, will be supported in their transformation from novice/supervised to master/unsupervised practitioners. This should not undermine the role of supervisory or regulatory bodies in the malpractice of independent practitioners. Milestones are expected to enhance the learning process by pacing training/assessment to match the developmental level of trainees (junior vs. senior).
- **Learning Domains:** Whenever possible, efforts should be directed to annotate the learning outcomes with the corresponding domain (K=Knowledge, S=Skills, and A=Attitude). There may be more than one annotation for a given learning outcome.
- **Content-Area Categorization:** It is advisable to categorize learning outcomes in broad content areas related to the professional practice. For example, diagnostic versus therapeutic, simple versus complex, urgent versus chronic, etc.

- **Trainees** are expected to progress through levels from novice to mastery in a certain set of professional competencies. The SCFHS has endorsed the CanMED framework to articulate professional competencies. This curriculum applies the principles of competency-based medical education. (ref. (Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 physician competency framework Ottawa: Royal College of Physicians and Surgeons of Canada 2015)

2. Program Duration

Five-year residency program

3. Program Rotations

Table 1

Mandatory core rotations*			Elective rotations**			Selective rotations***	
Rotation name	Duration	Training Year	Rotation name	Duration	Training Year	Rotation name	Duration
Histopathology Lab (technical)	1 month	R1	Research rotation	1 month	R3,R4, or R5	NA	
General Anatomic Pathology	10 months	R1	Autopsy rotation	1 month	R3,R4, or R5		
	11 months	R2					
	7-11 months	R3					
	6-11 months	R4					
	6-11 months	R5					
Liver pathology	1 month	R3,R4, or R5					
Neuropathology	1 month	R3,R4, or R5					
Dermatopathology	1 month	R3,R4, or R5					
Renal pathology	1 month	R3,R4, or R5					
Cytopathology	2 Months	R4 or R5					
Annual leave	1 month	Per year					

(*Mandatory core rotation: A set of rotations that represent mandatory program core components.

**Elective rotation: A set of rotations related to the specialty, as determined by the scientific council/committee, some of which the trainee is required to complete.

***Selective rotation: A set of other rotations selected by the trainee (directed by a mentor/program director) to enhance competency acquisition of the specialty).

4. Mapping of Learning Objectives and Competency Roles to Program Rotations:

MANDATORY ROTATIONS

1) Histopathology Lab (technical) (R1, 1-month duration)

Objectives:

Residents will be able to:

- Comprehend the specimen handling steps and their rationales (receiving, accessioning, and labeling).
- Know the thickness of histological sections (tissue cutting size for grossing and slides).
- Understand the tissue processing steps, including fixation, dehydration, clearing, infiltration, and embedding.
- Be familiar with the different types of fixative solutions used and their advantages and disadvantages.
- Grasp and demonstrate the preparation of glass slides, including microtome cutting, staining, and coversliping.
- Perceive basic knowledge about stain procedures used in routine histology and frozen sections.
- Identify and comprehend the different types of stains used for histology and frozen sections, including special stains (e.g., Periodic Acid Schiff (PAS), Grocott-Gomori's methenamine silver (GMS), Diff-Quick, etc.).
- Know the reasons for doing the frozen section.
- Master frozen section techniques, including cutting and staining frozen sections.
- Understand frozen section reporting methods regarding time and manner.

- Know the basic principles and uses of immunofluorescence, electron microscopy, and immunohistochemistry.
- Recognize the protective equipment used in the pathology laboratory
- Identify potential laboratory hazards, including biological hazards and handling sharp objects.
- Know how to deal with different situations related to personal safety and health, including cuts from sharp objects, infectious specimens, chemical eye burns, etc.

Clinical Competencies

Medical Expert

- Become familiar with basic histopathology techniques and gain knowledge of specimen acquisition, tissue processing, routine and special stains, and immunohistochemistry.
- Become familiar with laboratory safety policies and procedures.
- Describe the uses of fixatives (in particular, formalin), understand the principles of paraffin tissue processing, recognize the significance of correctly processed and oriented blocks, and describe the use of the microtome.
- Understand the basic reagents and staining principles used in hematoxylin and eosin staining and special stains (e.g., Gram stain, Congo Red, etc.).

Communicator

- Communicate effectively with medical colleagues, nursing, and technical staff both verbally and in written reports.
- Develop rapport, trust, and professional relationships with other physicians and allied health care workers.

Collaborator

- Work effectively with other health professionals to prevent, negotiate, and resolve interprofessional conflicts.

Manager

- Manage time in order to maximize educational resources and opportunities.
- The resident will acquire general knowledge of how to allocate finite

health care resources appropriately.

- Serve in administration and leadership roles, as appropriate.

Health Advocate

- Know and follow all safety precautions in the laboratory facility and strive to implement and follow all rules and regulations at all times.

Scholar

- Remain dedicated to ongoing learning and facilitate the learning of patients, families, students, residents, other health professionals, the public, and others, as appropriate.
- Contribute to the growth of medical knowledge through research.

Professional

- Always abide by the codes of ethics.
- Demonstrate commitment to excellence and ongoing professional development.

2) GENERAL ANATOMIC PATHOLOGY ROTATION:

First- and Second-Year Residency (R1:10 months, R2: 11 months))

At the beginning of training, trainees are expected to familiarize themselves with the normal anatomy and histology of various organs. Initially, each resident will be paired with a senior resident (R4 or R5) to learn frozen-section techniques, grossing techniques, and specimen preparation.

R1 and R2 residents will gradually begin preparing and grossing the majority of large specimens.

Residents are expected to read about standard grossing and handling from approved references for every case beforehand so that they have an understanding of the approach to the particular specimen.

The assigned pathologist must be available at all times to provide assistance and guidance to junior residents. Photography and proper triaging of the specimens should be performed.

After the case is grossed and the slides are available, the junior resident, along with the signing-out pathologist, may select a few cases to examine in order to document the microscopic findings and provide a diagnosis or differential diagnosis.

The junior resident asks the staff pathologist (and/or senior resident) for instruction and guidance at any time, as needed.

The one-to-one microscope review session is the mainstay of learning in surgical pathology.

Basic course for R1

This is a mandatory special course for R1 residents (one full day teaching per week for 2 months).

Its purpose is to review the basic anatomy and histology and to be a "**bridge**" rotation between clinical medicine and laboratory medicine. In addition to learning anatomy and histology, residents will have sessions on laboratory structure, tissue processing, special stains and ancillary techniques, and laboratory safety.

The histology portion will review the basic histology of all organ systems and will be taught by pathologists and senior pathology residents. A histology exam will be administered at the end of the rotation.

Residents will also receive instruction on histopathology and laboratory techniques, including a general orientation to the lab, a safety orientation, and hands-on experience in cutting sections from paraffin blocks and cutting frozen sections. They will also receive training on immunohistochemistry from the technical supervisor at the training institute.

Attendance is mandatory for first-year residents. During this course, the junior residents are exempted from the resident academic half day. They may attend academic half-day sessions once this course has been completed.

LEARNING OBJECTIVES AND CLINICAL COMPETENCIES:

- Surgical pathology reporting (including synoptic reporting and cancer staging)
- Operating-room consultations, frozen sections, and consultation reports
- Microscopy and photography
- Special studies
    - Histochemistry (special stains)
    - Electron microscopy
    - Immunofluorescence in kidney and skin disease
    - Immunohistochemistry

    - Flow cytometry
    - Cytogenetics and fluorescence in situ hybridization (FISH)
    - Molecular pathology
- Laboratory operation
    - Safety
    - Quality management (quality control, assurance, and improvement)
    - Errors in surgical pathology
    - Laboratory management
    - Pathology informatics
- Normal histology and anatomy
    - Skin
    - Connective tissue, bone, cartilage, and muscle
    - Cardiovascular system
    - Nervous system
    - Lymphatic system
    - Oral cavity and salivary glands
    - Gastrointestinal tract
    - Liver, gallbladder, and pancreas
    - Urinary system
    - Male reproductive system
    - Female reproductive system
    - Eye and ear
- Principles of specimen grossing
    - General principles of specimen grossing
    - Simple specimens and biopsies
    - Breast and sentinel lymph nodes
    - Skin
    - Thyroid, parathyroid, and adrenal glands
    - Lymph nodes and spleen
    - Esophagus, stomach, and small intestine
    - Colon
    - Liver
    - Pancreas and the Whipple procedure
    - Kidney

    - Urinary bladder
    - Prostate
    - Testis
    - Uterus and cervix
    - Ovary
    - Neuropathology specimens
    - Head and neck
    - Amputations and bone specimens
    - Lung and pleura
    - Heart explants
- Basic pathology (Main reference: Robbins & Cotran Pathologic Basis of Disease)
    - Cellular response to stress: Adaptation, injury, and death
    - Inflammation
    - Tissue renewal, regeneration, and repair
    - Hemodynamic disorders, thromboembolic disease, and shock
    - Genetic disorders
    - Diseases of the immune system
    - Neoplasia
    - Infectious diseases
    - Environmental and nutritional diseases
    - Diseases of infancy and childhood

Third-Year Residency (R3: 7–11 months)

Residents at this stage can take full responsibility for grossing specimens. They must also participate in guiding and teaching junior (R1 and R2) residents.

It is expected that residents will read each case beforehand so that they have an idea about the appropriate approach to the specimen.

The assigned pathologist must be available at all times to provide assistance and guidance to residents. It is advised that the cases be discussed with the assigned pathologist before grossing and that possibilities for ancillary testing, such as electron microscopy, flow cytometry, and cultures, be considered as well.

After a case is grossed and the slides are available, residents should view them, try to document the microscopic findings, and give their diagnosis or differential diagnosis.

Residents are required to read about cases and perform literature searches. Moreover, they are encouraged to maintain a regular schedule of reading standard textbooks to ensure that all topics are covered thoroughly.

In addition, residents should know common cytopathology specimens.

Clinical Competencies: (R1, R2, and R3)

Medical Expert/Clinical Decision Maker

- Master the grossing of common small and large surgical specimens.
- Develop gradual microscopic skills to identify common pathological findings in the routine surgical service of a medium-sized hospital.
- Be familiar with the principles of tissue fixation and processing, common special staining procedures (e.g., neutral fat, glycogen, elastin, etc.), and immunohistochemistry.
- Integrate clinical, radiological, and other laboratory data to provide the best diagnosis and direct further investigations and therapeutic strategies.
- Acquire basic knowledge and skills in diagnostic cytopathology.

Communicator

Participate in the continuing education of physicians and other members of hospital staff by taking part in conferences and case presentations.

Collaborator

Demonstrate the ability to advise on the appropriateness of obtaining histological and cytological specimens for diagnostic, teaching, and research purposes, as well as providing recommendations for further appropriate investigations.

Manager

Utilize time and resources effectively to balance patient care, budget restrictions, professional expectations, and personal life.

Health Advocate

Recognize and reinforce to the public and the medical profession the essential contribution of laboratory medicine to health.

Scholar

- Contribute to the development of new knowledge through research.
- Participate in rounds, conferences, and teaching sessions.
- Maintain and enhance professional activities through ongoing learning.

Professional

- Deliver the highest quality of care with integrity, honesty, and compassion.
- Practice medicine in an ethical manner and with sensitivity to the diversity of patients and coworkers.

Fourth- and Fifth-Year Residency (R4, R5: 6–11 months)

Outline of Rotation:

Senior residents at this stage assume a leadership and mentorship role for guiding junior residents. Apart from their daily duties of grossing and signing out, senior residents should mentor junior residents in grossing techniques and methods.

After grossing is complete and the slides are available, senior residents must review the slides, document the microscopic findings, and make a diagnosis or differential diagnosis.

A senior resident may order or request levels or deeper sections and may pull out previous slides, reports, radiological studies, or necessary ancillary testing in consultation with the assigned pathologist to prepare the case for final reporting with the staff pathologist.

- Senior residents should acquire clinical knowledge and master diagnostic skills in the field of cytopathology.

Residents are required to read about cases and perform literature searches. Residents are also encouraged to maintain a regular schedule of reading standard textbooks to ensure that all topics are covered thoroughly.

Clinical Competencies

Medical Expert/Clinical Decision Maker

- Develop knowledge of gross anatomy, histology, and ultrastructural morphology of normal cells, tissues, and organs and their embryologic development.
- Develop knowledge of the host response to injury, including etiological and pathogenic mechanisms, morphological alterations, and functional manifestations.
- Technical skills should be developed in the examination of surgically excised tissue; including intraoperative evaluation and gross examination, fine needle aspiration (FNA) procedures, performance of certain laboratory techniques, and proper utilization and care of light and electron microscopes.
- Acquire diagnostic skills in interpreting histology and cytology slides, electron microscopy images, special and immunohistochemical stains, flow cytometry, and molecular studies.
- Develop diagnostic skills in interpreting frozen section slides and be familiar with technical difficulties, the artifacts and pitfalls of frozen sections, and the limitations and indications of frozen sections.
- Demonstrate adequate knowledge about when to change the diagnosis of a frozen section case to permanent.
- Know the indication, limitation, and usefulness of each ancillary study and consult seniors and colleagues for difficult and unusual cases. In this way, they will become medical experts in the field of pathology.
- Develop skills in the interpretation of microscopic pathology to enable identification of common disease processes and formulation of a reasonable differential diagnosis for less common conditions.
- Effectively supervise routine technical procedures of the histology laboratory and troubleshoot any quality assurance and quality control issues that arise.

- Become familiar with the principles of tissue fixation and processing, common special staining procedures (e.g., neutral fat, glycogen, elastin, etc.), and immunohistochemistry in order to select appropriate stains and panels.
- Work effectively as consultants, integrating all CanMEDS roles to provide optimal, ethical, and patient-centered medical care.
- Establish and maintain clinical knowledge, skills, and attitudes appropriate to their practice.
- Integrate clinical, radiological, and other laboratory data to provide the best diagnosis and direct further investigations and therapeutic strategies.

Communicator

- Translate the diagnosis and interpretations into a clear, meaningful, well-formatted pathology report containing all relevant information that aids in patient management, including requests for additional samples. This also includes discussing the report with the responsible physician for proper interpretation of data and for conveying critical values.
- Communicate professionally during tumor board and multidisciplinary team meetings.
- Communicate clearly during the reporting of frozen sections. Be able to deal with any discrepancies in the permanent sections and convey them to the clinicians in a professional and skillful manner.
- Assist in the continuing education of physicians and other members of the hospital staff by participating in conferences and case presentations.
- Act as a consultant to clinical colleagues on the interpretation and relevance of pathological findings with particular regard to their significance in the patient management and assist in further diagnostic studies if samples are insufficient for diagnosis.
- Develop rapport, trust, and professional relationships with other physicians and allied health care workers, as well as with patients and their families (as needed).
- Accurately elicit and synthesize relevant information and perspectives of patients and families, colleagues, and other

professionals.

- Convey accurately relevant information and explanations to colleagues and other professionals.
- Develop a common understanding of issues and problems with colleagues and other professionals to develop a shared care plan that is in the best interest of both patients and families.
- Effectively convey oral and written information about medical encounters.

Collaborator

- Collaborate with other disciplines and clinical colleagues by providing support in patient management, education and training, research, and community health promotion. Be able to display good team spirit and interpersonal skills.
- Demonstrate the ability to advise on the appropriateness of obtaining histological and cytological specimens for diagnostic, teaching, and research purposes and provide recommendations on further appropriate investigations.
- Contribute effectively to interdisciplinary team activities by participating in interdisciplinary rounds or research activities.
- Participate effectively and appropriately in an interprofessional health care team.
- Work effectively with other health professionals to prevent, negotiate, and resolve interprofessional conflicts.
- Seek appropriate consultation from other health professionals, recognizing the limits of their expertise.

Manager

- Demonstrate knowledge of the organizational structure of the laboratory and effective skills for dealing with lab employees; familiarity with the current system of data coding, storage, and retrieval of specimens, slides, and tissue blocks; and knowledge of quality assurance and medical audits.
- Utilize time and resources effectively to balance patient care, budget restrictions, professional expectations, and personal life.
- Develop general ideas on how to effectively allocate finite resources

in health care and health education to optimize patient care and lifelong learning.

- Work effectively and efficiently in a medical laboratory organization.
- Become familiar with quality control procedures in histology.
- Participate in activities that contribute to the effectiveness of health care organizations and systems.
- Manage practice and career effectively.
- Serve in administrative and leadership roles as appropriate.

Health Advocate

- Participate in promoting both the health of patients as individuals and the health of communities. Be able to recognize opportunities for health promotion and disease prevention and make every effort to play an active role in them.
- Try to participate in various volunteer work in nonprofit organizations (e.g., the Saudi Cancer Society, Sanad, Zahra, etc.) to promote and educate the community about the importance of screening and early cancer detection. Be familiar with the role of molecular methods used to screen for familial cancer syndromes.
- Identify important determinants of health pertaining to disease processes that affect patients.
- Assist in regularly evaluating laboratory practices and test selections to determine whether they meet community needs.
- Recognize and reinforce to the public and the medical profession the essential contribution of laboratory medicine to health.
- Respond to individual patient health needs and issues as part of patient care.
- Respond to the health needs of the communities they serve.
- Identify the determinants of health of the populations they serve.
- Promote the health of individual patients, communities, and populations.
- Acquire appropriate quality assurance and quality control knowledge and become aware of their own diagnostic limitations and thresholds to ensure patient safety and accuracy of medical and pathological reports.

Scholar

- Demonstrate a conscious commitment to continuous learning as well as the creation, dissemination, application, and translation of medical knowledge.
- Maintain professionalism through learning. Because much cutting-edge knowledge in cancer therapy is a result of basic pathology research and studies, it is crucial that anatomic pathologists integrate new learning into practice after analyzing relevant evidence. They should be familiar with the art and principles of critical appraisal and be able to integrate conclusions into practice.
- Acquire skills in Medline research using relevant medical search engines and review the literature as necessary to make proper diagnoses.
- Develop and implement personal strategies for continuing education.
- Apply the principles of critical appraisal to sources of medical information.
- Contribute to the development of new knowledge through research.
- Participate in rounds, conferences, and teaching sessions.
- Maintain and enhance professional activities through ongoing learning.
- Evaluate critical information and its sources and apply this knowledge appropriately to decisions in their practice.
- Facilitate the learning of patients, families, students, residents, fellow health professionals, the public, and others as appropriate.
- Contribute to the creation, dissemination, application, and translation of new medical knowledge and practices.

Professional

Abide by the Code of Ethics for Health Care Practitioners published by the SCFHS.

Be committed to the health and well-being of individuals and society through ethical practice sourced by both the guidance of Islam and international ethics conventions.

Personal standards of behavior should be inspired by Islamic principles, and the anatomic pathologists must strive to develop the best of manners within themselves, such as

- truthfulness,
- honesty and integrity,
- humbleness and respect for others,
- patience,
- passion and love, and
- moderation and fairness.

Professionalism is to be practiced toward patients and colleagues alike.

http://www.scfhs.org.sa/Media/OtherPublications/Documents/%d8%a3%d8%ae%d9%84%d8%a7%d9%82%d9%8a%d8%a7%d8%aa%20%d8%a7%d9%84%d9%85%d9%85%d8%a7%d8%b1%d8%b3%20%d8%a7%d9%84%d8%b5%d8%ad%d9%8a.pdf

Senior residents should be able to:

- Deliver the highest quality of care with integrity, honesty, and compassion.
- Practice medicine in an ethical manner, with sensitivity to diversity in patients and coworkers.
- Exhibit appropriate professional behavior and perform duties in a dependable, consistent, and responsible manner.
- Demonstrate a commitment to excellence and ongoing professional development.
- Demonstrate a commitment to patients, the profession, and society through ethical practice.
- Demonstrate a commitment to patients, the profession, and society through participation in profession-led regulation.
- Demonstrate a commitment to physician health and sustainable practices.

3) CYTOPATHOLOGY ROTATION (2 months during R4 or R5)

Objectives of cytopathology training

Trainees should be able to practice as independent cytopathologists, applying all CanMEDS roles to provide the best and most accurate patient care, as outlined below:

1) Respond effectively, efficiently, and with sincerity and honesty to internal and external consultation requests.
2) Respect ethical issues arising during patient care.
3) Organize and prioritize professional duties focusing on patient care.
4) Be familiar with legal issues that may arise from common samples and how to respond to legal testimony.

Clinical competencies

Medical Expert

Integrate all of the CanMEDS roles; for example, utilizing medical knowledge, clinical skills, and a professional attitude to provide patient-centered care.

Acquire clinical knowledge and skills in the diagnostic cytopathology field from the basic to the advanced level, including the following:

- Acquire and integrate knowledge of basic cell morphology, histology, physiology, and human anatomy.
- Acquire and integrate knowledge of disease pathogenesis and morphology at the cellular, tissue, organ, and body levels.
- Acquire integrated knowledge of the morphological changes of disease at the gross, histological, cytological, and ultrastructural levels.
- Learn all cytological preparation methods, including direct smear preparation, cytospin, conventional Pap smear, liquid-based cytology (thin prep, SurePath), or equivalent methods using different procedures.
- Know different methods of fixation, routine staining, special staining, and immunohistochemical staining.
- Be able to read all smears prepared by the methods mentioned above as per standard diagnostic criteria listed in major reference books.

- Be able to describe the findings of light microscopy in perfect, correct, clear, and concise language.
- Be familiar with the concept of cell block preparation and its practical uses.
- Be able to interpret findings to provide an accurate diagnosis or a perfect differential diagnosis.
- Know the advanced ancillary tests, such as molecular tests (namely *in situ* hybridization [ISH], immunofluorescence, cytogenetic tests, fluorescent *in situ* hybridization [FISH], and flow cytometry), and how to request and properly interpret them to help provide an accurate diagnosis.

Communicator

- Issue comprehensive, clear, concise, accurate, and timely cytology reports that include all relevant data important for patient management and further diagnostic workup.
- Deliver clear verbal information to the responsible physicians and health care workers and be able to ask clear questions to obtain clinical information helpful for proper interpretation of morphologic data.
- Use synoptic and SNOMED reporting systems when available and applicable.
- Recommend or provide advice on further diagnostic measures when relevant.
- Participate in a professional dialogue for medico-legal cases if indicated.
- Discuss professionally complicated cases, consultations, controversial issues, and discrepancies in the diagnoses and handling of samples.
- Speak in public and give presentations to health care professionals with clear language that matches the audience's level of comprehension.
- Explain procedures, such as fine-needle aspiration cytology, to patients and relatives clearly with an explanation of the advantages and disadvantages.
- Communicate critical results and unexpected findings through

appropriate channels in a timely fashion.

- Communicate clearly during intraoperative consultations.

Collaborator

- Work within a team and be an effective team member.
- Collaborate with all members of the pathology team, including technical and administrative team members, training physicians, and senior colleagues, in order to provide the best service to patients.
- Maintain a professional attitude when participating with other health care members to obtain and provide the information needed for the best patient care.
- Explain the role of the cytologist to all health care providers.
- Participate in team meetings with other health care workers when requested.
- Respect team ethics and confidentiality.
- Minimize misunderstandings and maximize team functions to best utilize interpersonal interactions for patient care.
- Make time and effort to assist others when needed for the sake of patient care.

Manager

- Make decisions about the recruitment of human resources, budget allocations, and implementation of quality programs and safety.
- Participate in activities that contribute to the effectiveness of the organization's health care system.
- Collaborate effectively with other organizations.
- Identify pre-analytical, analytical, and post-analytical issues that affect quality.
- Serve in leadership roles.

Health Advocate

- Utilize knowledge, skills, and expertise to advance health and well-being within the community.
- Identify areas for improvement, promotion, disease prevention, and advocacy.
- Respond to health care needs within the community.
- Update cytology laboratory tests to meet community needs.

- Increase the community's awareness of the need for gynecological Pap tests as a screening program and of the importance of molecular confirmatory tests and vaccinations for human papilloma virus.

Scholar

In addition to helping patients, health care workers, and the community learn and improve their knowledge, practice independent, lifelong learning to stay up to date on all aspects of cytopathology knowledge and skills.

Professional

- Respect the health and well-being of individuals and society through ethical practice and professionalism.
- Express commitment to patients, the profession, and society through ethical practice, which includes honesty, integrity, commitment, compassion, respect, and altruism.
- Practice commitment to the highest quality of care.
- Identify and appropriately respond to ethical issues.
- Respect patients' rights and confidentiality.

References for Cytology:

Diagnostic principles and clinical correlates. Edmund S. Cibas & Barbara S. Ducatman.

4) LIVER PATHOLOGY ROTATION (1 month during R3, R4, or R5)

Medical liver diseases are important pathological entities that a general pathologist might encounter. The main goal of this rotation is for residents to gain sound knowledge on how to approach and interpret common medical liver diseases and how to interact effectively with the clinical team.

General objectives:

- Achieve diagnostic competence in common pathological features of medical liver diseases.
- Recognize self-limitations and seek a second opinion or further

investigation when needed.

- Be able to generate comprehensive and meaningful reports and convey messages clearly to the clinical team.
- Be familiar with all technical aspects of and procedures for dealing with a liver biopsy as well as quality assurance in surgical pathology.
- Be a self-directed learner and seek continuous medical education.

Clinical competencies

Medical expert

- Demonstrate knowledge of normal anatomy, physiology, and histology of the liver.
- Acquire in-depth knowledge of the normal gross microscopic and ultrastructural appearance of liver tissues and cells.
- Acquire knowledge about the pathogenesis and underlying mechanism of liver insult.
- Diagnose common medical liver diseases.
- Acquire thorough knowledge about liver transplant pathology and the current classifications used.
- Develop an understanding of the principles of tissue processing and the use and indications of different fixatives and special stains, as well as the technical principles underlying them.
- Simulate a differential diagnosis based on histologic features and architectural changes.
- Organize case-material special stains of deeper sections and additional studies in a timely fashion and be able to generate a final pathology report with a meaningful comment if needed.

Communicator

- Communicate effectively and collegially with other pathologists regarding cases.
- Participate in multidisciplinary team meetings and contribute to the continuous education of physicians and other team members.
- Generate a clear pathology report and communicate findings effectively in both oral and written form.

Collaborator

- Contribute effectively to other interdisciplinary team activities.

- Render sound advice on how to obtain appropriate histological specimens.

Manager

- Use laboratory and institutional resources appropriately.
- Allocate finite health care resources wisely.
- Understand the importance of quality control and quality assurance measures for immunohistochemistry stains, including pre-analytical, analytical, and post-analytical variables.
- Make decisions regarding acceptable versus unnecessary requests for URGENT/STAT processing of specimens and prioritize cases according to urgency in a timely fashion.

Health Advocate

See above for surgical pathology competencies.

Scholar

Practice independent lifelong learning to stay up to date on the knowledge and skills of liver pathology diagnostics and help others learn and improve their knowledge for patients, the community, and health care workers.

Professional

- Respect the health and well-being of individuals and society through ethical practices and professionalism.
- Express commitment to patients, the profession, and society through ethical practice, which includes honesty, integrity, commitment, compassion, respect, and altruism.
- Practice commitment to the highest quality of care.
- Respond quickly to urgent requests and night calls.
- Identify and appropriately respond to ethical issues.
- Respect patients' rights and confidentiality.

5) RENAL PATHOLOGY ROTATION (1 month during R3, R4, or R5)

Medical renal diseases are one of the common pathological entities that a general pathologist might encounter. The main goal of this rotation is for residents to gain sound knowledge on how to approach and interpret common medical renal diseases and how to interact effectively with the clinical team.

General objectives:

- Achieve diagnostic competence in common pathological features of medical renal diseases.
- Recognize self-limitations and seek a second opinion or further investigation when needed.
- Be able to generate comprehensive and meaningful reports and convey messages clearly to the clinical team.
- Be familiar with all technical aspects and procedures for dealing with kidney biopsy as well as quality assurance in surgical pathology.
- Be a self-directed learner and seek continuous medical education.

Clinical competencies

Medical expert

- Demonstrate knowledge of normal anatomy, physiology, and histology of the kidney.
- Acquire in-depth knowledge of the normal gross microscopic and ultrastructural appearance of kidney tissues and cells.
- Acquire knowledge about the pathogenesis and underlying mechanism of renal insult.
- Diagnose common medical renal diseases.
- Acquire thorough knowledge about renal transplant pathology and the current classifications used.
- Understand the principles of immunofluorescence diagnosis.
- Develop an understanding of the principles of tissue processing and the use and indications of different fixatives and special stains, as well as the technical principles underlying them.
- Know the principles of and indications for ultrastructural diagnosis in renal pathology.
- Simulate a differential diagnosis based on histologic features and architectural changes.

- Organize case-material special stains of deeper sections and additional studies in a timely fashion.
- Generate a final pathology report with a meaningful comment if needed.

Communicator

- Communicate effectively and collegially with other pathologists regarding cases.
- Participate in multidisciplinary team meetings and contribute to the ongoing education of physicians and other team members.
- Generate a clear pathology report and communicate findings effectively in both oral and written form.

Collaborator

- Contribute effectively to other interdisciplinary team activities.
- Render sound advice on how to obtain appropriate histological specimens.

Manager

- Use laboratory and the institutional resources appropriately.
- Allocate finite health care resources wisely.
- Understand the importance of quality control and quality assurance measures for immunohistochemistry stains, including pre-analytical, analytical, and postanalytical variables.
- Make decisions regarding acceptable versus unnecessary requests for STAT processing of specimens and prioritize cases according to urgency in a timely fashion.

Health Advocate

See above for surgical pathology competencies.

Scholar

Practice independent lifelong learning to stay up to date on all aspects of renal pathology diagnostics while helping others learn to improve patients', the community's, and health care workers' knowledge.

Professional

- Respect the health and well-being of individuals and society through ethical practices and professionalism.
- Express commitment to patients, the profession, and society through ethical practice, which includes honesty, integrity, commitment, compassion, respect, and altruism.
- Practice commitment to the highest quality of care.
- Respond quickly to urgent requests and night calls.
- Identify and appropriately responds to ethical issues.
- Respect patients' rights and confidentiality.

6) DERMATOPATHOLOGY ROTATION (1 month during R3, R4, or R5).

Medical Expert

- Demonstrate knowledge of the histology and embryology of the skin and adnexal structures.
- Be aware of different types of skin biopsies and know how each specimen is processed.
- Acquire sufficient knowledge of the interpretation of skin biopsies of inflammatory and neoplastic conditions.
- Acquire thorough knowledge of the interpretation of skin excisions for melanoma and sentinel node biopsies and be able to prepare reports conveying appropriate information to clinicians.
- Acquire thorough knowledge of the interpretation of skin excisions for other neoplastic skin lesions and be able to prepare reports conveying appropriate information to clinicians.
- Recognize inflammatory skin conditions that might require clinico-pathological correlation.
- Provide a logical interpretation during intraoperative consultation.

Communicator

- Communicate effectively and collegially with other pathologists regarding cases.
- Participate in multidisciplinary team meetings and contribute to the continuous education of physicians and other team members.
- Generate a clear pathology report and communicate findings effectively in either oral or written form.

Collaborator

- Contribute effectively with other interdisciplinary team members.
- Render sound advice on how to obtain appropriate histological specimens.

Manager

- Use laboratory and the institutional resources appropriately.
- Allocate finite health care resources wisely.
- Understand the importance of quality control and quality assurance measures for immunohistochemistry stains, including pre-analytical, analytical, and post-analytical variables.

Health Advocate

See above in surgical pathology competencies.

Scholar

Practice independent lifelong learning to stay up to date on all aspects of dermatopathology knowledge and skills while helping others learn to improve patients', the community's, and health care workers' knowledge.

Professional

- Respect the health and well-being of individuals and society through ethical practice and professionalism.
- Express commitment to patients, the profession, and society through ethical practice, which includes honesty, integrity, commitment, compassion, respect, and altruism.
- Practice commitment to the highest quality of care.
- Identify and appropriately respond to ethical issues.
- Respect patients' rights and confidentiality.
- Recognize self-limitations and seek help when needed.

7) NEUROPATHOLOGY ROTATION (1 month during R3, R4, or R5)

Rotation Outline

Trainees perform a 1-month rotation with a neuropathologist, during which they should achieve the CanMEDS competencies mentioned in the objectives of the anatomic pathology section. All residents must adhere to the following guidelines:

- Review the neurohistology and anatomy from the recommended educational references.
- Attend to frozen sections, specimen grossing, and case sign- outs, (including brain, nerve, and muscle biopsies) with the neuropathologist, starting on the first day of the rotation.
- Prepare complete reports for each case.
- Review teaching cases and other available teaching materials during this rotation.

*A brain autopsy is typically done during the autopsy rotation.

Clinical competencies

Medical Expert

- Acquire comprehensive knowledge about gross findings of the brain and spinal cord.
- Acquire sufficient microscopic knowledge of the nervous system.
- Know the current classification and criteria of tumors of the nervous system.
- Acquire good knowledge of inflammatory, infectious, and benign diseases of the nervous system.
- Be aware of the appropriate use of basic histologic techniques, including immunohistochemistry and electron microscopy, in the examination of the nervous system.
- Handle neurosurgical specimens for frozen sections and preparation of smears and interpret these techniques to render a verbal diagnosis.
- Recognize the limits of one's expertise and seek appropriate

consultation from other health professionals when needed.

Communicator

- Communicate effectively and collegially with other pathologists regarding cases.
- Participate in multidisciplinary team meetings and contribute to the continuous education of physicians and other team members.
- Generate a clear pathology report and communicate findings effectively in either oral or written form.

Collaborator

- Contribute effectively to interdisciplinary team activities.
- Render sound advice on how to obtain appropriate histological specimens.

Manager

- Appropriately use laboratory and institutional resources.
- Allocate finite health care resources wisely.
- Understand the importance of quality control and quality assurance measures for immunohistochemistry stains, including pre-analytical, analytical, and post-analytical variables.

Health Advocate

See above in anatomic pathology competencies.

Scholar

- Practice independent lifelong learning to stay up to date on all aspects of neuropathology knowledge and skills while helping others learn to improve patients', the community's, and health care workers' knowledge.

Professional

- Respect the health and well-being of individuals and society through ethical practice and professionalism.
- Express commitment to patients, the profession, and society through ethical practice, which includes honesty, integrity, commitment, compassion, respect, and altruism.
- Practice commitment to the highest quality of care.
- Respond quickly to urgent requests and night calls.

- Know self-limitations and seek help when needed.
- Identify and appropriately respond to ethical issues.
- Respect patients' rights and confidentiality.

ELECTIVE ROTATIONS

1- Autopsy Rotation

Postmortem pathology

Postmortem pathology is a subspecialty of anatomic pathology that focuses on the diagnosis, management, and prevention of disease, trauma, and poisoning of the human body at the postmortem phase. Therefore, the term "postmortem human care management" is preferred. The pathologist's role includes the formulation of an opinion regarding the identification, cause, and manner of human death, taking into consideration the history and autopsy findings with a possible medicolegal scope.

Postmortem human care management includes all medical issues after human death, including (but not limited to) ethics, law, professionalism, forensic medicine, community safety, community interest, and research. The pathologist's end goal is holistic postmortem human care management.

The current authorizing body for postmortem human care management in Saudi Arabia is the Bureau of Investigation and Public Prosecution (BIP). Therefore, the BIP functions as a coroner.

Requirements

- At least R3 residents prior to starting the 1-month-long rotation.
- The hosting facility must provide optimal, internationally accepted standard precautions, including (but not limited to) scrubs, surgical gowns, plastic aprons, hair nets, eye shields, face masks, cut-proof gloves, and latex and latex-free gloves.
- All vaccinations should be up to date.
- At least one complete postmortem report must be completed in a timely fashion, pending any ancillary investigations.
- Attend the postmortem pathology course provided by the Anatomic

Pathology program conducted and delivered by a consultant pathologist licensed by the SCFHS with at least 1 year of post-pathology board training in postmortem pathology and recognized by the AP program as a qualified supervisor.

- Dress professionally according to the SCFHS regulations and display identification at all times.
- Never share sensitive information gained during the rotation with colleagues or the public.
- Always ensure a consultant pathologist (or an individual authorized by the local authority at the level of consultant) is present prior to beginning cases in the autopsy suite. (Never begin any case without the presence of a consultant.)
- Only continue cases when at least a board-certified pathologist (or an individual authorized by the local authority at the level of a fellow) is present.

Evaluation

- Daily evaluations should be conducted by a host institute consultant present at the autopsy.
- The end-of-rotation presentation should be evaluated by a consultant pathologist licensed by the SCFHS with at least 1 year of post-pathology board training in postmortem pathology and recognized by the AP program as a qualified supervisor.
- Exams should be completed as dictated by the AP program.

Clinical competencies

Medical Expert

- Understand the history of postmortem pathology in Saudi Arabia.
- Understand the history of postmortem pathology internationally.
- Recognize the ethics of postmortem pathology.
- Recognize the different authorization systems.
- Understand the authorization process in Saudi Arabia.
- Understand the authorization process internationally.
- Recognize notifiable/reportable cases locally and compare them to international standards, including the motives and benefits of each category.

- Recognize the difference(s) between local and international standards for forensic and hospital autopsies.
- Comprehend the pathologist's role in human death management, including identification, cause, and manner of death.
- Realize the pathologist's role in recommending the prevention of trauma, poisoning, and disease.
- Recognize the value, techniques, and theory of death-scene investigation.
- Recognize the various tools available for identification of human remains.
- Recognize the various collaborative specialties and their role in postmortem management, including forensic sciences, health care specialties, and others.
- Recognize the various collaborative specialties and their role in postmortem management, including officers dealing with law enforcement, public safety, military officers, and others.
- Recognize the various collaborative specialties and their role in postmortem management, including employees dealing with matters concerning justice, health, and social services.
- Recognize the various autopsy techniques.
- Recognize the value and techniques of external examination.
- Recognize the value and techniques of internal examination, including autopsy, limited autopsy, region-specified autopsy, organ-specified autopsy, biopsy, and medical imaging.
- Realize when to optimally perform studies such as histology, cytology, electron microscopy, microbiology and virology, toxicology, neuropathology, medical imaging, metabolic and genetic tests, and others.
- Realize when to order and optimal techniques to collect samples for microbiology, virology, toxicology, neuropathology, metabolic and genetic tests, and trace evidence.
- Recognize the optimal way to certify cause and manner.
- Understand the concepts of cause, manner, and mechanism of death.

Communicator

- Be able to establish a professional bond with the family of the

deceased and the community.

- Demonstrate the ability to use various types of communication (verbal, written, and others) and know when each is required.
- Exhibit an understanding that the family of the deceased needs effective, timely, clear, and accurate communication.
- Establish the ability to use the postmortem report as a communication tool.
- Demonstrate the ability to work comfortably with a community composed of various races, ethnicities, educational and cultural backgrounds, as well as diverse religious and personal beliefs regarding death, cadavers, postmortem management, and the afterlife.
- Realize how various autopsy techniques may be used and their impact on the body, how the body is released, and the beliefs and feelings of the relatives of the deceased.

Collaborator

- Demonstrate effective skills to participate in a professional environment as part of a multidisciplinary team with the shared goal of postmortem human care management.
- Develop skills to optimally reach scientific goals with a diverse team of people who have various racial, cultural, religious, and personal beliefs regarding death, cadavers, postmortem management, and the afterlife.
- Demonstrate a respectful attitude toward other colleagues and other members of the professional team.
- Work with other professionals to prevent conflicts.
- Use collaborative negotiation to resolve conflicts.
- Respect differences, misunderstandings, and limitations of other professionals.
- Acquire skills to establish professional bonds with team staff, collaborative professionals, learners, and the community.
- Demonstrate the ability to use various types of communication (verbal, written, and others) and know when each is required.
- Meet the need for effective, timely, clear, and accurate communication and understand the different requirements of various agencies and

professionals.

- Establish the ability to use the postmortem report as a communication tool.

Manager

- Demonstrate an understanding of and familiarity with the management structure of both the authorizing body and the laboratory, as well as the relationship between them.
- Recognize the leadership role of the pathologist as the center of postmortem human care management.
- Understand the principles of workload requirements and time management.
- Demonstrate knowledge of laboratory safety for all personnel.
- Understand the principles of laboratory information systems.
- Understand the principles of quality assurance, quality control, and quality improvement as they pertain to postmortem pathology.
- Know the regulations pertaining to the storage of the human body, organs, tissues, tissue blocks, slides, and reports.
- Be familiar with legislation about medicolegal issues, abide by it, and guide other staff members to do so as well.

Health Advocate

- Understand and demonstrate the role of the pathologist in providing accurate information pertaining to public health issues, particularly those related to injury, poisons, and disease (infectious disease, hereditary disease, environment- and occupation-related injury and disease, death patterns, mass fatalities, custody deaths, judicial deaths, perinatal and infancy deaths, maternal deaths, deaths due to a specific disease, etc.).
- Act as a health advocate by understanding and demonstrating all necessary personal and team safety precautions in the autopsy room, at the death scene, and in the laboratory and office.
- Recognize and demonstrate how postmortem pathology can promote the health of the population.

Scholar

- Recognize the importance of scholarship.

- Recognize the importance of research and continuous medical education.
- Demonstrate knowledge of basic and clinical research and special research techniques.
- Demonstrate the ability to objectively record results and prepare research proposals and manuscripts.
- Recognize personal gaps in knowledge and how to remedy them.
- Demonstrate the ability to ask appropriate questions and access suitable resources and references.
- Recognize both planned and opportunistic methods of learning.
- Demonstrate effective personal time management with regard to maximizing educational opportunities.
- Be capable of self-directed study using appropriate texts and information resources.
- Demonstrate the ability to mentor others and share learned information appropriately with both health care and non-health care personnel, taking into consideration their level of understanding.
- Be knowledgeable about the use of virtual libraries and online resources.

Professional

- Demonstrate concern and respect for others and sensitivity togender, culture, and ethnicity issues with peers, supervisors, and health care and non-health care personnel.
- Exhibit an ethical approach to the performance of duties at the death scene, office, autopsy suite, and laboratory.
- Recognize limitations and seek assistance when required.
- Demonstrate a collegial manner at all times.
- Solicit cooperation and volunteer assistance.
- Recognize professional limits and seek advice and assistance from appropriate individuals in a timely manner.
- Respond appropriately to criticism.
- Demonstrate punctuality.
- Complete tasks in a timely manner.
- Act as a model of professionalism for juniors and the public in both the workplace and the community at large.

- Demonstrate competency, integrity, and honesty.
- Respect confidentiality regarding any information obtained as a result of the occupation.

2-Molecular Pathology and Cytogenetics Rotation

Objectives

- Understand basic molecular biology techniques in molecular pathology.
- Grasp comprehensive knowledge of principles and concepts of the molecular basis of disease by this stage; the rotation will aim to reinforce the clinical use of this knowledge.
- Understand the molecular biomarkers in diagnosis, prognosis, prediction, therapy, and monitoring of diseases.
- Understand the various indications of molecular testing in disease processes.
- Appreciate the role of the pathologist in molecular testing.
- Obtain a general understanding of quality control/quality assurance and total quality management in molecular testing.
- Participate in didactic lectures in molecular pathology and cytogenetics/FISH; these are to be arranged by the chair of the local committee either on the resident's academic half day or as short courses/workshops (see Appendix for examples).

Note: Residents must give one case presentation or topic presentation discussing the importance of molecular pathology with a description of the technique and methodology.

Division	Weeks	Technique	Outcome
Molecular Genetics	Weeks 1–3	• Selecting tissue for molecular analysis. • Nucleic acid extraction, processing, and storage. • Clonality testing for T and B cells. • Polymerase chain reaction (PCR) • Reverse transcriptase PCR (RT-PCR) • Quantitative PCR • Allele-specific PCR • Principal and application of DNA sequencing (Sanger, NGS) • Detection of microsatellite instability • DNA-based tissue identity testing (by short tandem repeats (STRs)) for chimerism or forensic testing • Single-strand conformation polymorphism (SSCP) • Restriction fragment length polymorphism (RFLP) analysis • Gel electrophoresis	The resident will review the principles of medical genetics and be familiar with the principles of cell division, nondisjunction error, imprinting, mutation, and chromosome structure. In addition, he/she will understand the principles and techniques involved in molecular genetics, molecular oncology, and molecular detection of infectious diseases.
Cytogenetics & FISH	Weeks 1–2	• Karyotype • FISH/CISH • DNA microarray • Comparative genomic hybridization (CGH) • Single nucleotide polymorphism (SNP) microarray	The resident will learn the difference between site-specific, repeat-sequence, and whole-chromosome painting probes and appropriate applications of each.

Note: Each supervisor should ensure that all R5 residents have done this rotation during their senior years (years 3, 4, and 5) before the exit exam.

Clinical competencies

Medical Expert

- Be able to select the best formalin-fixed paraffin-embedded (FFPE) block for molecular testing and the area of maximum yield of tumor cells in the H and E sections.
- Develop and maintain basic and clinical knowledge of molecular pathogenesis and disease processes.
- Become familiar with the principles of polymerase chain reaction (PCR), sequencing, electrophoresis, instrumentation, data processing, and software analysis.

Communicator

- Take the opportunity to educate colleagues and members of the multidisciplinary team during clinico-pathological conferences and presentations on issues related to genetics, molecular biology, and genomics.
- Be part of patient management by advising clinicians when needed about the indications, interpretations, and clinical utility of molecular assays and molecular aspects of diseases.
- Communicate with requesting physicians to advise them on the appropriate use of molecular diagnostic and cytogenetic methods.

Collaborator

- Communicate with physicians upon request to advise them on the appropriate use of molecular diagnostic and cytogenetic methods.
- Facilitate the requests of clinicians when ordering particular tests vital for patient management.

Manager

- Understand issues of quality control, quality improvement, risk, cost-effectiveness, and laboratory management as they specifically relate to molecular pathology and cytogenetics.
- Be familiar with quality management and quality essentials in molecular pathology.
- Engage health professionals and the medical community in determining appropriate laboratory use of molecular testing to advance health care.

- Recognize advances in molecular biology that can be applied to molecular diagnostics to increase efficiency and enhance diagnostic techniques.

Scholar

- Be committed to a personal strategy of continuing education.
- Remain up to date with the rapidly developing field of molecular genetics and genomics and its application to laboratory diagnostics.
- Be able to search the scientific literature to critically assess the development of new tests in molecular pathology and cytogenetics.

Professional

- Deliver the highest standard of care with integrity, honesty, and compassion and execute duties in an ethical manner with sensitivity to a diverse patient population.
- Exhibit appropriate professional behavior and practice medicine in a dependable and responsible manner.
- Demonstrate a commitment to excellence and ongoing professional development.
- Demonstrate a commitment to patients, the profession, and society through ethical practice and participation in profession-led regulation.
- Demonstrate a commitment to physician health and sustainable practices.

Research Rotation

Objectives

- Anatomic pathology residents are required to complete a 2-month rotation with a certified researcher or in a recognized research department or facility during the third year of training. The purpose of this rotation is to expand residents' knowledge base and research skills, increase their understanding of basic science and basic pathology, and enhance interpretation of statistical data. During this rotation, residents should be able to create and initiate a minimum of two research ideas and conduct research projects during their training years.

- Residents are advised to read and understand the SCFHS publication "Introduction to Clinical Research for Residents." http://www.scfhs.org.sa/Media/OtherPublications/Documents/Introduction%20to%20Clinical%20Research%20for%20Residents%20(16.9.14)%20Hani%20Tamim%20(FC1).pdf

Clinical Competencies

Medical Expert

- Be able to generate research ideas in relation to pathology.
- Be able to choose and design a research project in an optimized way.
- Be able to read and interpret statistical data.
- Be able to conduct a literature search.
- Know how to write a paper.
- Be able to read, interpret, and critique articles.
- Conduct a computerized literature search using Medline, PubMed, or an equivalent method.
- Select the appropriate study design with which to answer the question.

Communicator

- Upon the conclusion of the project, present it as grand rounds or during an academic or research day.
- Write a scientific abstract for potential submission to a regional or national research meeting.

Collaborator

- Be able to work with other team members from different specialties on a combined project.

Health Advocate

- Advocate for research to promote an understanding of various disease processes or the means of delivering care.

Manager

- Understand the cost of research and be able to set a budget plan.

Scholar

- Compare data with those previously collected and determine differences.
- Try to hypothesize the reasons for similarities or differences with other studies.

Professional

- Respect patients' privacy with respect to medical information when performing research.
- Understand the function of the institutional review board (IRB) and how it serves to protect patients.
- Be knowledgeable about research ethics and know when patient consent must be obtained. (http://www.scfhs.org.sa/Media/OtherPublications/Documents/Introduction%20to%20Clinical%20Research%20for%20Residents%20(16.9.14)%20Hani%20Tamim%20(FC1).pdf).
- Be honest when reporting data.

3- Other Subspecialty Rotations

These rotations might be incorporated into the surgical pathology rotations or be taken as separate rotations, depending on the hospital in which the resident is rotating. These include but are not limited to:

- Head and neck pathology
- Soft tissue and bone pathology
- Pulmonary and cardiovascular system (CVS) pathology
- Breast pathology
- Gynecologic pathology
- Hematopathology
- Urologic pathology
- Gastrointestinal pathology
- Pediatric pathology
- Endocrine pathology

The curriculum and associated competencies relate principally to "core" (non-elective) training in anatomic pathology. Currently, we do not aim

to define specific competencies for advanced training in specific subspecialty areas such as gynecological pathology, breast pathology, or soft tissue pathology.

Residents should achieve the general Anatomic Pathology Core Competencies outlined in the surgical pathology rotations in each of the subspecialty areas.

Because individual residency programs show marked variation in the sequence and duration of individual rotations, the scientific committee for the Saudi Board in Anatomic Pathology believes it is neither realistic nor desirable to specify certain diagnoses or defined numbers of cases of a given type as elements of competency. All SCFHS-accredited training programs are already required to provide a caseload sufficiently high and varied to ensure broad training.

Example of a subspeciality rotation

Hematopathology Rotation

Outline of Rotation

The lymph node pathology block will take place over a continuous 1 month.

Residents will develop a practical approach to assessing lymph node pathology and will become familiar with the use of ancillary tests (including flow cytometry, fluorescence, *in situ* hybridization, and molecular diagnostic testing) to facilitate the diagnosis of lymphoma. Residents will be actively involved in ordering ancillary tests and generating final reports under the supervision of staff pathologists. Archival lymphoma cases on file and pathologists' teaching files are readily available for study. Trainees will learn the up-to-date classifications of neoplastic lesions, various non-neoplastic lesions, and related pitfalls.

At the completion of training, residents will:

- Understand the normal histology of various solid lymphoreticular
- organs, including lymph nodes, the spleen, bone marrow, and the thymus.
- Understand the basis of the current World Health Organization (WHO) classification system of hematopoietic neoplasms and how it has evolved.
- Know the key pathologic and clinical features of the major lymphoma entities, including Hodgkin lymphoma, small lymphocytic lymphoma/chronic lymphocytic leukemia, lymphoplasmacytic lymphoma, marginal zone lymphoma, mantle cell lymphoma, follicular lymphoma, diffuse large cell lymphoma, lymphoblastic lymphoma, Burkitt/Burkitt-like lymphoma, and peripheral T-cell lymphoma, among others.
- Be familiar with the role of immunophenotyping by flow cytometry and immunohistochemistry in establishing a definitive diagnosis of these lymphomas.
- Understand the role of molecular diagnostic techniques in establishing a definitive diagnosis of lymphoma (also see the "molecular diagnostics" section).

Clinical competencies

Medical Expert

- Develop and demonstrate the ability to accurately diagnose lymphoproliferative disorders in a variety of organ systems.
- Gain sufficient knowledge about the gross and light microscopic appearance of lymph nodes and other lymphoreticular systems.
- Obtain all relevant clinical and radiological information and apply it to a diagnostic approach.
- Be aware of the major pitfalls of lymphoma pathology and know how to work on these cases.
- Be aware of limitations due to limited sample size, poor fixation, or crushing artifacts when rendering diagnoses.

- Acquire adequate knowledge of the use of ancillary techniques such as immunohistochemistry, flow cytometry, molecular gene rearrangement, and FISH.
- Act as an effective consultant pathologist for external cases sent for consultation or secondary review.

Communicator

- Communicate effectively with medical colleagues, including technologists, oncologists, radiologists, and coordinators.
- Know how to clearly request further special and ancillary studies.
- Participate in lymphoma rounds with the supervision of the consultant pathologist.
- Prepare a pathology report with a clear diagnosis and be able to write clear comments or further recommendations if needed.

Collaborator

- Contribute effectively to interdisciplinary team activities by participating in interdisciplinary rounds or research activities.
- Participate effectively and appropriately in an interprofessional health care team.
- Work effectively with other health professionals to prevent, negotiate, and resolve interprofessional conflicts.
- Recognize the limits of their expertise and seek appropriate consultation from other health professionals when needed.
- Work up referrals or outside consultation cases effectively and efficiently, making use of the limited diagnostic material available to make a definitive diagnosis, and convey the results in a clear and timely manner.

Manager

- Work well with fellow colleague residents, technologists, pathologists, and clinical colleagues in the process of arriving at a diagnosis.
- Troubleshoot any problems related to quality assurance and quality control in laboratory operations specifically related to immunohistochemistry.

Health Advocate

- Promote technological advances that play an important role in lymphoma diagnosis and strive to introduce relevant new technologies locally.
- Help establish outreach programs and provide assistance for referral centers to facilitate accurate diagnoses and better management.

Scholar

- Be committed to a personal, continuing educational strategy to remain up to date with new classifications, diagnostic criteria, and developments.
- Critically evaluate information and sources and apply this appropriately to decisions in practices.
- Facilitate the learning of patients, families, students, residents, other health professionals, the public, and others as appropriate.
- Contribute to the creation, dissemination, application, and translation of new medical knowledge and practices.

Professional

- Deliver the highest quality of care with integrity, honesty, and compassion.
- Demonstrate the high level of maturity and sense of responsibility expected of all professionals.
- Exhibit appropriate personal and interpersonal professional behavior.
- Respond quickly to urgent requests and night calls.
- Know their own limitations and seek help when in need.
- Practice medicine that is ethically consistent with the principles of Islam and the obligations of a physician.

ELECTIVE TRAINING OUTSIDE THE KINGDOM

Elective training outside the Kingdom is permissible under the following regulations:

- The resident should be in the third or fourth year of training.

- Training is allowed for 6 continuous months or may be split into a maximum of two rotations.
- An application and the acceptance letter from the institute should be submitted 6 months prior to the start of the next academic year.
- Upon completion, a confidential sealed and stamped evaluation by the resident's supervisor in the institute abroad should be provided.
- Please note that if the elective rotation was performed in a subspecialty domain (as in Table 1), then this period will be deducted from the resident's training period in that particular domain

IX. CONTINUUM OF LEARNING

This includes learning that should take place in each key stage of progression within the specialty. Trainees are reminded of the fact of lifelong continuous professional development (CPD). Trainees should keep in mind the necessity of CPD for every health care provider in order to meet the demands of their vital profession. The following table shows how the role is progressively expected to develop throughout the junior, senior, and consultant levels of practice.

Undergraduate	R 1–3 (Junior Level)	R 4–5 (Senior Level)	Consultant
Non-practicing	Dependent/supervised practice	Dependent/supervised practice	Independent practice/provide supervision
Obtain basic health science and foundational level of core discipline knowledge	Obtain fundamental knowledge related to core clinical problems of the specialty	Apply knowledge to provide appropriate clinical care related to core clinical problems of the specialty	Acquire advanced and up-to-date knowledge related to core clinical problems of the specialty
Participate in an internship in the practice of discipline	Apply clinical skills such as physical examination and practical procedures related to the core presenting problems and procedures of the specialty	Analyze and interpret the findings from clinical skills to develop appropriate differential diagnoses and management plan for the patient	Compare and evaluate challenging, contradictory findings and develop expanded differential diagnoses and management plan for the patient

X. TEACHING METHODS:

The teaching process in postgraduate residency training programs is based mainly on the principles of adult learning theory. The trainees feel the importance of learning and have active roles in the content and process of their own learning. The training programs implement the adult learning concept on each feature of the activities, whereby the residents are responsible for their own learning requirements. Formal training time includes the following three formal teaching activities:

- Program-specific learning activities
- Universal topics
- General learning opportunities

1.1. Program-specific learning activities:

Program-specific activities are educational activities that are specifically designed and intended for instructing trainees during their training time. Trainees are required to attend these activities, and non-compliance can subject trainees to disciplinary actions. It is advisable to link attendance and participation in these activities to continuous assessment tools (see formative assessment section below). Program administration should support these activities by providing protected time for trainees to attend and participate in these activities.

A) Program academic half-day:

Every 2 weeks, at least 2–4 hours of formal training time (commonly referred to as an academic half day) should be reserved. A formal teaching exercise is an activity that is planned in advance with an assigned tutor, time slots, and a venue. Formal teaching time excludes daily sign-out teaching, teaching slides sessions, etc. The academic half day covers the core specialty topics that are determined and approved by the specialty's scientific council and aligned with the specialty-defined competencies and teaching methods. The core specialty topics will ensure that trainees are well informed of important clinical

problems of the specialty. It is recommended that lectures be conducted in an interactive, case-based discussion format. The learning objectives of each core topic need to be clearly defined, and it is preferable to use pre-learning materials. Whenever applicable, core specialty topics should include workshops and team-based learning (TBL) to develop skills in core procedures. Regional supervisory committees, in coordination with academic and training affairs, program directors, and chief residents, should collaborate to ensure appropriate planning and implementation of academic activities, as indicated in the curriculum. Trainees should be actively involved in the development and delivery of the topics under faculty supervision; the involvement might be in the form of delivery, content development, research, etc. The supervisor's educator should ensure that the discussion of each topic is stratified into three categories of the learning domain: knowledge, skills, and attitude.

The recommended number of half days that are conducted annually is 8–10 (24–30 sessions) per training academic year, with time reserved for other forms of teaching methods such as journal clubs and clinical/practical teaching. Through the residency training committee, program directors, and chief residents (in coordination with academic and training affairs and regional supervisory committees) should work together to ensure appropriate planning and implementation of academic activities, as indicated in the curriculum. The aims should be to use available resources efficiently and to optimize the exchange of expertise.

An example of the academic half day table is shown in Appendix E.

B) Practice-based learning:

Training exposures during daily grossing and sign-out cases and other work-related activities, including courses and workshops, represent excellent targets for learning. Trainees are expected to build their capacity based on self-directed learning.

On the other hand, practice-based learning allows the educator to supervise trainees to become competent in the required program

practical skills that ensure the fulfillment of knowledge, psychomotor, and/or attitude learning domains. It would be prudent to determine the minimum number of procedures to be performed before training completion and the minimum number needed to maintain competency after certification.

This section will allow each program to describe the required courses or workshops in detail, including the objectives of the course or the workshop, the teaching methods, the expected time to complete the course/workshop during the training, and the assessment method applied for each activity. It is highly advisable to integrate these activities with relevant formative assessment tools.

1.2. Universal Topics

Universal topics are educational activities developed by the SCFHS and are intended for all specialties. Priority will be given to topics as follows:

- High value
- Interdisciplinary and integrated
- Require expertise that might be beyond the availability of the local clinical training sites

Universal topics have been developed by the SCFHS and are available, such as e-learning via personalized access for each trainee (to access the online modules). Each universal topic will have a self-assessment at the end of the module. As indicated in the "executive policies of continuous assessment and annual promotion," universal topics are mandatory components of the criteria for the annual promotion of trainees from their current level of training to the subsequent level. Universal topics are distributed over the entire training period.

See Appendix C for universal topics

Current universal topics by training year

Training Year	Modules		Topic names	
	Number	Name	Number	Name
R1	Module-1	Introduction	Topic-2	Hospital acquired infection
R2	Module-2	Cancer	Topic-9	Cancer prevention
R3	Module-3	Diabetes and Metabolic Disorders	Topic-13	Comorbidities of obesity
R4	Module-7	Ethics and Healthcare	Topic-31	Occupational hazards of health care workers (HCW)

1.3 General Learning Opportunities:

Formal training time should be supplemented by other practice-based learning (PBL), such as:

- Journal clubs
- Grand rounds
- Tumor board and clinico-pathological meetings
- Involvement in quality improvement committees and meetings
- Continuous professional activities (CPD) relevant to specialty (conferences and workshop)
- Morbidity and mortality (M&M)

The M&M conference offers trainees an opportunity to discuss patient cases where adverse effects have occurred due to errors or complications. The goal of this resource is to refocus on the content of morbidity and mortality and transform it into a platform for teaching patient safety principles and emphasizing error reduction strategies.

XI. ASSESSMENT AND EVALUATION

1. Purpose of Assessment

Assessment plays a vital role in the success of postgraduate training. Assessment will guide trainees and trainers to achieve defined standards, learning outcomes, and competencies. In addition, the assessment will provide feedback to learners and faculty regarding curriculum development, teaching methods, and quality of the learning environment. A reliable and valid assessment is an excellent tool for assessing curriculum alignments among objectives, learning methods, and assessment methods. Finally, assessment assures patients and the public that health professionals are safe and competent to practice.

Assessment can serve the following purposes:

a. Assessment for learning enables trainers to use information from trainees' performance to inform their learning for improvement; educators use information about trainees' knowledge, understanding, and skills to provide feedback to trainees that helps them learn how to improve.
b. Assessment as learning involves trainees in the learning process, which enables them to monitor their own progress. Trainees use self-assessment and educators' feedback to reflect on their progression. This develops and supports trainees' metacognitive skills. Assessment as learning is crucial in helping residents/fellows become lifelong learners.
c. Assessment of learning is used to demonstrate learning achievement. This is a graded assessment and usually counts toward the trainee's end-of-training degree.
d. Feedback and evaluation as assessment outcomes will represent quality metrics that can improve the learning experience.

Miller's Pyramid of Assessment provides a framework for assessing trainees' clinical competences and acts as a roadmap for the trainers to select the assessment methods to target different clinical competencies, including "knows," "knows how," "shows how," and "does" (see Appendix F).

For the sake of organization, assessment will be further classified into two main categories: formative and summative.

2. Formative Assessment

2.1 General Principles

Trainees, as adult learners, should strive for feedback throughout their journey of competency from "novice" to "mastery" levels. Formative assessment (also referred to as continuous assessment) is the component of assessment that is distributed throughout the academic year and primarily aims to provide trainees with effective feedback.

Every 3 months, at least 1 hour should be assigned by the program director to meet with trainees in order to review performance reports (e.g., In-Training Evaluation Report (ITER)). Input from the overall formative assessment tools will be utilized at the end of the year to determine whether individual trainees will be promoted to the next training level. Formative assessment will be defined based on the scientific council recommendations, which are usually updated and announced for each individual program at the start of the academic year.

According to the executive policy on continuous assessment (available online: www.scfhs.org), formative assessment will have the following features that will be used based on Miller's pyramid (Appendix F):

a. Multisource: Minimum four tools.
b. Comprehensive: Covering all learning domains (knowledge, skills, and attitude)
c. Relevant: Focusing on workplace-based observations
d. Competency milestone oriented: Reflecting the trainee's expected competencies that match the trainee's developmental level

Trainees should play an active role in seeking feedback during training. However, trainers are expected to provide timely and formative assessments. The SCFHS will provide an e-portfolio system to enhance communication and analysis of data arising from formative assessments.

Trainers and trainees are directed to follow the recommendations of the scientific council regarding the updated forms, frequency, distribution, and deadlines related to the implementation of evaluation forms.

2.2 Formative Assessment Tools "Editing"

Learning Domain	Formative Assessment Tools	Important details (e.g., frequency, specifications related to the tool)
Knowledge	- Annual Written Progress Test (Local or International) - Structured Academic Activities (basic course for R1, journal club, case presentation) - Case-Based Discussion (CBD)	- Residents should present journal club and case presentations every 6-months of rotation. - R5 residents should attend and present in three clinoco-pathologic/tumor board meetings (CBD)
Skills	- OSCE: Objective structured clinical examination - Log Book - Research Activities	- Log Book (R5 residents should perform four intraoperative consultation cases) - Research Activities for R5 residents (an accepted or published paper during residency)
Attitude	ITER: In-Training Evaluation Report	Every 3 months

The evaluation of each component will be based on the following equation:

Percentage	< 50%	50–59.4%	60–69.4%	>70%
Description	Clear fail	Borderline fail	Borderline pass	Clear pass

To achieve unconditioned promotion, the candidate must score a minimum of "borderline pass" in all five components.

The program director can still recommend the promotion of candidates if the above requirements are not met in some situations:

- If the candidate scored "borderline failure" in one or two components at maximum, and these scores do not belong to the same area of assessment (for example, both borderline failures should not belong to skills).
- The candidate must have passed all other components and scored a minimum of clear pass in at least two components.

3. Summative Assessment

3.1 General Principles

Summative assessment is a component of assessment that primarily aims to make informed decisions on trainees' competency. In comparison to formative assessment, summative assessment does not aim to provide constructive feedback. For further details on this section, please refer to the general bylaws and executive policy of assessment (available online: www.scfhs.org). In order to be eligible to set for the final exams, trainees will be granted a "Certification of Training Completion" upon successful completion of all training rotations.

3.2 First Part Examination (if Applicable)

This is applicable only to residency programs. It is a written exam that permits the trainee to be promoted from the "junior" to the "senior" level of training. For further details on the first part of the examination, please refer to general bylaws and executive policy of assessment (available online: www.scfhs.org).

Blueprint Outlines: The content of the following table is for demonstration only. Please refer to the most updated version published on the SCFHS website.

A blueprint of first part of the exam is shown in the following table:

Example of Part One Anatomic Pathology Examination Blueprint

No.	Sections	Percentage (%)
1	Surgical Pathology (including frozen section)	25
2	Cytopathology	9
3	General Pathology	34
4	Systemic Pathology	15
5	Gross Pathology	3
6	Quality and Safety	3
7	Ancillary Studies1	3
Research, Ethics and Professionalism, and Patient Safety		8
TOTAL		100%

Ancillary studies[1] include special stains, immunohistochemistry, molecular and cytogenetic studies, and electron microscopy.

3.3. Final in-training Evaluation Report (FITER)

In addition to approval of the completion of clinical requirements (resident's logbook) by the supervising committee, the FITER is also prepared by program directors for each resident at the end of his or her final year of training. This report shall be the basis for obtaining the certificate of training program completion and the qualification to sit the final specialty examinations.

3.4 Certification of Training-Completion

To be eligible to sit the final specialty examinations, each trainee is required to obtain a "Certification of Training-Completion." Based on the training bylaws and executive policy (please refer to www.scfhs.org), trainees will be granted a "Certification of Training-Completion" once the following criteria are fulfilled:

a. Successful completion of all training rotations.
b. Completion of training requirements (e.g., logbook, research, others) as outlined in the FITER, which is approved by the scientific council of specialty.

c. Clearance from SCFHS training affairs, which ensures compliance with tuition payments and completion of universal topics.
d. Passing the first part of the examination (whenever applicable).

A "Certification of Training-Completion" will be issued and approved by the supervisory committee or its equivalent according to SCFHS policies.

3.5 Final Specialty Examinations

The final specialty examination is the summative assessment component, which grants trainees the specialty's certification. It consist of two elements:

a. Final written exam: To be eligible to sit this exam, trainees are required to first obtain a "Certification of Training-Completion."
b. Final clinical/practical exam: Trainees are required to pass the final written exam to be eligible to sit the final clinical/practical exam.

Blueprint Outlines: The content of the following table is for demonstration purposes only. Please refer to the most updated version published on the SCFHS website.

Blueprints of the final written and clinical/practical exams are shown in the following table.

Example of the Final Written Anatomic Pathology Examination Blueprint

No.	Sections	Percentage (%)
1	Surgical Pathology (including frozen section)	55
2	Cytopathology	15
3	Quality and Safety	8
4	Special Stains and Immunohistochemistry	5
5	Molecular and Cytogenetics studies and electron microscopy	4
6	General Pathology	5
7	Autopsy and Forensic Pathology	3
Research, Ethics and Professionalism, and Patient Safety		5

TOTAL	100%

Note:

- Blueprint distributions in the examination may differ up to ±3% in each category.
- Percentages and content are subject to change at any time. See the SCFHS website for the most up-to-date information.

Example of the Final Clinical Exam Blueprint

		DIMENSIONS OF CARE				
		Health Promotion & Illness Prevention 1±1 Station(s)	Acute 5±1 Station(s)	Chronic 3±1 Station(s)	Psychological Aspects 1±1 Station(s)	# Station(s)
DOMAINS FOR INTEGRATED CLINICAL ENCOUNTER	Patient Care 7±1 Station(s)	1	4	2		7
	Patient Safety & Procedural Skills 1±1 Station(s)		1			1
	Communication & Interpersonal Skills 2±1 Station(s)			1	1	2
	Professional Behaviors 0±1 Station(s)					0
	Total Stations	1	5	3	1	10

*Main blueprint framework adapted from the Medical Council of Canada Blueprint Project.

For further details on the final exams, please refer to general bylaws and executive policy of assessment (available online: www.scfhs.org).

Learning Domain	Summative Assessment Tools	Passing Score
Knowledge	- Final Written Examination	At least borderline pass in each tool in accordance with the standard setting method used by the executive administration of assessment
Skills	- Objective Structured Clinical Examinations (OSCE) - Structured Oral Examinations (SOE)	At least borderline pass in each tool in accordance with the standard setting method used by the executive administration of assessment
Attitude	FITER: In-Training Evaluation Report	Successfully pass FITER

SAUDI BOARD FINAL CLINICAL EXAMINATION OF ANATOMIC PATHOLOGY (2020)

Exam Format

a. The final clinical Anatomic Pathology Saudi Board Examination consists of eight stations, divided into four components as follows:

1. Short cases (spot diagnosis) exam: 30 cases (histopathology virtual slides) – Station #1

- Duration: 75 minutes.
- Candidates will be asked to state the most specific diagnosis for each case.
- Candidates will write a single diagnosis for each case.
- For each case, the patient's age and sex will be provided.
- The site from which the tissue was taken will also be provided when required or useful to make the diagnosis.
- Other pertinent history may be provided in select cases.

2. Computer based exam: 30 cases (images) — Station #2

- Duration: 75 minutes.

- Displayed in a PowerPoint slide presentation.
- Consists of cytopathology, flow cytometry, molecular studies, ancillary studies, autopsy/forensic cases, and gross pathology.

3. Structured Oral Exam (SOE): 6 cases = 6 stations, review phase, and note taking

- Four long complex cases and two frozen section cases/cytology.
- Candidates will have approximately 60 minutes to review six cases.
- Candidates will review virtual slides associated with these cases.
- A brief history of each case (including age, sex, and site) will be provided.
- Candidates are encouraged to take notes and to think about possible questions that may be asked.
- Candidates will then be asked to move to the structured oral exam (SOE) exam room, where two examiners will discuss each case with the candidates (see number 4).

4. Structured Oral Exam (SOE): 6 cases, actual oral exam (60 minutes – approximately 10 minutes each)

- A diagnosis for these cases may not necessarily be made by looking at the slides provided alone.
- Some cases may require the candidate to obtain additional history or clinical information that is not initially provided.
- Other cases may require the candidate to order or interpret ancillary studies.
- Topics such as history, clinical information, and other diagnostic tests, including ancillary studies, may form the basis for supplementary questioning by examiners.
- In addition, candidates' knowledge and clinical competency in communication, collaboration, patient safety, laboratory management, and professionalism are usually assessed in this portion of the examination.
- The SOE component will be conducted by two examiners based on predetermined questions and unified model answers.

* Short cases, computer-based exams, and SOE case development will follow the SCFHS standards.

XII. PROGRAM AND COURSE EVALUATIONS

The SCFHS applies variable measures to evaluate the implementation of this curriculum. Training outcomes of this program undergo the quality assurance framework endorsed by the Central Training Committee at the SCFHS. Trainees' assessment (both formative and summative) results will be analyzed and mapped to curriculum content. Other indicators that will be incorporated are as follows:

- Reports from the annual trainees' satisfaction survey
- Reports from trainees' evaluation of faculty members
- Reports from trainees' evaluation of rotations
- Reports from the annual survey of program directors
- Data available from program accreditations
- Reports from direct field communications with trainees and trainers

Goal-based evaluation: The intended milestone achievements are evaluated at the end of each stage to assess the progress of the curriculum delivery. Any deficiency will be addressed in the following stage utilizing the time devoted to trainee-selected topics and professional sessions.

In addition to subject-matter opinion and best practices from benchmarked international programs, the SCFHS applies a robust method to ensure that all available data are utilized during future revisions of this curriculum.

XIII. POLICIES AND PROCEDURES

This curriculum represents the means and materials and outlines the learning objectives with which trainees and trainers interact to achieve the identified educational outcomes. The Saudi Commission for Health Specialties (SCFHS) has a full set of "General Bylaws" and "Executive Policies" (published on the official SCFHS website) that regulate all training-related processes. The general bylaws of training, assessment, and accreditation, as well as executive policies on admission, registration, continuous assessment and promotion, examination, trainees' representation and support, duty hours, and leaves are examples of regulations that need to be implemented. Under this curriculum, trainees, trainers, and supervisors must comply with the most updated bylaws and policies, which can be accessed online via the official SCFHS website.

XIV. APPENDICES

A. Junior-level Competency Matrix

B. Senior-level Competency Matrix

C. Universal topics modules

D. Top Conditions and procedures in the specialty

E. An example of academic half day table

F. Miller's Pyramid of Assessment

G. Glossary

H. How to write objectives in SMART style

I. Example of a research rotation objective

J. References

Appendix A

MILESTONES IN SURGICAL PATHOLOGY R 1-5

Resident Evaluation by Faculty	Overall Perfor mance	Failed to meet expectations:	Inconsistently met expectations:	Consistently met expectations:	Sometimes exceeded expectations:	Exceeded expectations:
Overall performance compared to others at same level linked to ITER ratings		- Consistently absent from work	- Several unexcused absences during rotation	- Was punctual for work and arrived prepared	- Substantially contributed to efficient team functioning	- Successfully integrated clinico-pathological information to generate complete and accurate surgical pathology reports
				- Was receptive to feedback and consistently pleasant to all colleagues		
		- Consistently negative attitude	- Clear lack of interest in subject matter		- Was capable of timely generation of complete surgical pathology reports	- Communicated well with both pathology and clinical colleagues
				- Showed active desire to improve		

		- Failure to respond to feedback	- Inability to improve despite mid-rotation feedback		- Demonstrated baseline medical knowledge and diagnostic ability greater than expected for level of training	- Ready to practice surgical pathology independently
				- Demonstrated the expected level of baseline medical knowledge and diagnostic ability		
		- Baseline knowledge and/or diagnostic ability significantly below expectations for level of training	- Severe deficits in baseline knowledge and diagnostic ability			

cholar/Medical Expert	Medical Knowledge	Is capable of searching for and finding written and published resources for learning in pathology	Has acquired a moderate amount of textbook knowledge of pathology	Is able to independently perform literature review and apply it toward patient care	Is dedicated to continuous medical education and literature review
					Participates in educating others
		Understands common surgical procedures and the resultant specimens	Correctly describes and appropriately samples common surgical specimens, including necessary tissues for ancillary studies in correct media/fixative	Applies principles of grossing to newly encountered specimen types	Demonstrates competency across a broad range of complex specimens

Medical Expert	Surgical pathology grossing	Recognizes the importance of grossing for the interpretation of histology and patient management	Correlates clinical and/or radiological information and uses it in specimen handling	Correctly describes and appropriately samples most surgical pathology specimens	Correctly describes and appropriately samples all specimen types
		Understands the importance of identity and integrity of the specimen as well as the information written on the requisition form	Understands the components of an appropriate and complete gross report	Recognizes when additional sampling is necessary for diagnosis or staging	Dictates complete, logical, and succinct gross descriptions
		Knows how to deal with simple surgical specimens, including description and sampling	Knows how to use grossing manuals for newly encountered specimen types	Produces gross reports that contain all the necessary information for patient management	Discusses the reasons for frozen sections with the surgeon

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
Medical Expert		Ensures and maintains the integrity of specimens to avoid cross-contamination or identity mix-up	Understands the importance of time management during IOC/FS	Independently performs a gross description and selects tissue for frozen- section diagnosis		
	Intraoperative consultation/	Understands common surgical procedures that may need potential intra- operative consultation/ frozen sections (IOC/FS)		Is able to perform high- quality IOC/FS on technically difficult and/or multiple specimens		
	Frozen sections	Knows the technical aspects of the performance of frozen sections	Is aware of indications and contraindications for IOC/FS		Communicates appropriately with the surgeon, asking appropriate questions that influence the diagnosis	
			Is able to perform a gross description	Effectively communicates and is aware of the impact of diagnosis	Is proficient in the performance and interpretation of IOC/FS	
			prior to sampling the specimen			
			Procures tissue for diagnosis under supervision		Is able to manage competing tasks, especially in time- sensitive situations	

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
Medical Expert	Microscopic diagnostic practice		Understands what information needs to be conveyed to the surgeon following IOC/FS		Is able to perform IOC/FS correlation with permanent histology specimens	
		Recognizes normal anatomy and histology	Consistently recognizes and correctly identifies the most common histopathologic findings	Correlates the clinical differential diagnosis with gross and microscopic pathologic findings	Reliably makes accurate diagnoses	
		Distinguishes normal from abnormal histology and recognizes confounding factors (e.g., tissue artifacts and processing and sampling issues)	Begins to make connections between clinical differential diagnoses and gross and microscopic pathologic findings	Consistently recognizes and correctly identifies common and some rare histopathologic findings	Appreciates the nuances of diseases and is able to independently troubleshoot confounding factors	
			Is aware of what microscopic	Is able to troubleshoot confounding factors with assistance	Analyzes complex cases, integrates	
			findings warrant going back to the		literature, and reviews clinically relevant information	
			gross specimen		Is proficient in interpretation with	

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
Medical Expert/	Reporting				comprehensive review of medical records and seeks both intradepartmental and external Consultations appropriately	
		Is familiar with the essential elements of a pathology report	Is able to write a preliminary report before the sign- out session	Can generate a complete report of common specimens	Can generate a complete report of all specimens and includes synoptic reporting when necessary	
Communicator/ Health Advocate		Ensures that reviewed reports are accurate	Is becoming familiar with synoptic reporting	Knows how and when to use synoptic reporting and understands its relevance	Is able to convey equivocal findings or atypical findings in a clear and proper manner that is comprehensible for clinical colleagues	
			Resects time frames and deadlines and is able to hand in cases in a timely fashion	Generates reasonable comments to convey difficult issues or dilemmas to clinical colleagues	Knows how to write clear comments and may suggest or recommend further biopsies or investigations when needed in a collegial manner	
					Recognizes when to be clear and firm on a diagnosis Recognizes that some diagnoses cannot be decisive due to limitations and is able to convey this clearly in his/her report to the team as well as colleagues	

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
				Shows increasing efficiency in grossing specimens, previewing slides, and writing reports	Can completely gross and review slides while on a busy service and drafts a full pathology report before the sign-out session with the pathologist	
Manager/Leader	Time management	Comprehends the need for efficiency in grossing and reviewing slides with the pathologist in a timely manner	Is able to review selected cases from the workload and attempts to write preliminary reports in a timely fashion	Is familiar with synoptic reporting	Is able to efficiently gross and review all cases and finds time to teach junior residents	
				Organizes the workflow to assist junior residents if needed	Realizes the importance of turnaround time and its implications for patient management	
				Suggests an appropriate panel of ancillary tests without wasting resources	Is able to manage his/her time to present in tumor-board and multidisciplinary meetings	
			Has a general concept of how to order tests while being conscious of resources		Has a good command of the concepts of appropriate test ordering	
Manager/Leader and Health Advocate	Lab management: Test utilization	Is aware of the different tests, immunohistochemical assays, and other ancillary studies available in anatomic pathology	Is starting to understand ordering practices and is aware of appropriate and inappropriate ordering	May make judgments on which tests to order in a stepwise manner while taking the differential diagnosis into account and is able to justify those tests	Takes quality assurance deficits into account	

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
					Understands the importance of controls in immunohistochemistry in every run	
					Can confidently interpret ancillary test results in a clinical context	
					Is able to pick up subtle and atypical findings	
		Realizes the importance of clinical history and findings in formulating a reasonable differential diagnosis and final diagnosis			Performs root-cause analysis for ambiguous and uncertain results and suggests methods to overcome them	
			Under the supervision of the attending pathologist, observes and is able to actively interact with radiologists, physicians, and surgeons to obtain further history or information regarding a specimen	Is able to interpret pathology reports efficiently and discuss findings with clinical colleagues	Routinely communicates with clinical colleagues to formulate a narrow differential diagnosis	
Communicator / Collaborator	Inter- departmental and clinical team interactions	Appreciates the pathologist's role in patient management				
Communicator / Collaborator	Multidisciplinary conferences	Recognizes the importance of multidisciplinary conferences (MDC) in making an accurate diagnosis and, therefore, in patient care	Tries to attend the MDCs	Actively participates in the MDCs	Prepares for and presents at the MDCs in the presence of other pathologists	

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
				Is able to discuss various errors with other members of the health care system in a professional manner	Develops a solid rapport with clinicians and is able to communicate with them clearly and collegially in a respectful manner	
		Is always truthful and is aware of ethical behavior	Is always truthful and owns up to any personal mistakes and errors		Is able to discuss various errors with other members of the health care system in a professional manner	
Professionalism	Honesty, integrity, ethical behavior, respect, compassion, and empathy	Seeks guidance or advice when needed	Demonstrates ethical behavior	Demonstrates ethical behavior	Demonstrates ethical behavior	
		Accepts criticism or guidance during counseling for possible misbehavior	Practices with respect, compassion, and empathy	Practices with respect, compassion, and empathy	Practices with respect, compassion, and empathy	
		Has a basic understanding of respect, compassion, and empathy				
Professionalism	Responsibility and follow-through on tasks	Finishes tasks on time (grossing, sign-out)	Completes tasks in a timely manner	Is dependable and can foresee the team's needs	Foresees the team's needs and takes a leadership position to meet them	

Primary Competency (AP Milestone Identifier) & Title		R1	R2	R3	R4	R5
Professionalism			Respects schedules		Is proactive in taking responsibility and demonstrating leadership skills	
	Giving and receiving feedback	Receives feedback constructively	Accepts feedback and is able to make behavioral adjustments in order to improve	Is able to provide constructive feedback to junior colleagues and attending pathologists as needed	Is a role model for juniors in receiving and giving constructive feedback	
		Is receptive and welcoming to suggestions for improvement			Seeks feedback in order to improve	
				Acknowledges weaknesses and seeks help when needed to avoid diagnostic errors and discrepancies	Is able to coach juniors on how to deal with constructive criticism	
		Realizes that people are error-prone and acknowledges where errors might happen	Is aware of self-limitations and capabilities		Acknowledges weaknesses and seeks help when needed to avoid diagnostic errors and discrepancies	
Manager/Leader	Recognition of errors and discrepancies		Takes responsibility for errors that might happen		Knows how to convey diagnostic errors and discrepancies to clinical colleagues	
		Takes responsibility for errors that might happen		Initiates discussion of errors and discrepancies with the attending pathologist	Understands and practices good ethics when faced with a case with diagnostic errors and discrepancies	

Junior-Level Competency Matrix: Mapping Competency, Learning Domain, and Milestones

(The content included here is just an example of pediatrics.)

Training Year level	Competency Roles (with annotation of learning domains involved: K: Knowledge, S: Skills, A: Attitude)	Professional Activities Related to Specialty					
		Conducting full patient clinical assessment	Managing high-risk newborns in the delivery room and NICU	Managing patients undergoing procedures	Managing febrile children	Managing unstable children	Compliance with documentation and proper reporting standards
R1	Professional Expert	Mastering history taking and physical examinations K, S	High-risk delivery, initial steps, NRP, and NICU care K, S, A	Clinical and laboratory evaluation, hydration, NPO, and risk assessment K, S	Assessing and managing febrile children K, S	Evaluating and managing unstable children (abnormal vital signs) K, S	Relevant documentation of daily patient care, prescriptions, and discharge summaries K, S, A
	Communicator	Effective communication with patients and guardians K, S, A	Effective communication with parents and team members K, S, A	Informed consent K, S	Effective communication with patients, guardians, and team members K, S, A	Effective communication with patients, guardians, and team members K, S, A	Writing, dictation, and presentation skills K, S

	Collaborator		Multidisciplinary, team work S, A	Multidisciplinary, team work S, A	Seeking support from senior physicians when needed K, S, A	Seeking support from senior physicians when needed K, S, A	Interprofessional communication A
	Advocate	Holistic approach and preventive medicine K, S, A		Patient safety K, S, A	Patient safety K, S, A	Patient safety K, S, A	Quality improvement K, S, A
	Leader	Time management S	Team leadership S, A		Deciding what is in patients' best interest S, A	Deciding what is in patients' best interest S, A	Quality assurance K, S, A
	Scholar			Evidence-based practice K, S	Evidence-based practice K, S	Evidence-based practice K, S	
	Professional		Confidentiality, interprofessional relations A			Interprofessional relations A	Interprofessional relations A
R2	Competency Roles (with annotation of learning domains involved: K: Knowledge, S: Skills, A: Attitude)	Professional Activities Related to Specialty					
	Professional Expert						
	Communicator						
	Collaborator						
	Advocate						
	Leader						
	Scholar						
	Professional						

Appendix B

Senior-Level Competency-Matrix: Mapping Competency, Learning Domain, and Milestones

Training Year level	Competency Roles (with annotation of learning domains involved: K: Knowledge, S: Skills, A: Attitude)	Professional Activities Related to Specialty					
R3	Professional Expert						
	Communicator						
	Collaborator						
	Advocate						
	Leader						
	Scholar						
	Professional						

R4	Competency Roles (with annotation of learning domains involved: K: Knowledge, S: Skills, A: Attitude)	Professional Activities Related to Specialty					
	Professional Expert						
	Communicator						
	Collaborator						
	Advocate						
	Leader						
	Scholar						
	Professional						

Appendix-C

Universal Topics

Intent:

These are high value, interdisciplinary topics of utmost importance to the trainee. The reason for delivering the topics centrally is to ensure that every trainee receives high-quality instruction and develops essential core knowledge. These topics are common to all specialties.

The topics included here meet one or more of the following criteria:

- Impactful: These are topics that are common or life-threatening.
- Interdisciplinary: Topics that are difficult to learn from a single discipline.
- Orphan: Topics that are poorly represented in the undergraduate curriculum.
- Practical: Topics that trainees will likely encounter in hospital practice.

Development and Delivery:

Core topics for the PG curriculum will be developed and delivered centrally by the commission through an e-learning platform. A set of preliminary learning outcomes for each topic will be developed. Content experts, in collaboration with the central team, may modify the learning outcomes.

These topics will be didactic in nature, with a focus on practical aspects of care. These topics will be more content-heavy than workshops and other face-to-face interactive sessions planned.

The suggested duration for each topic is 1.5 hours.

Assessment:

The topics will be delivered in a modular fashion. At the end of each learning unit, there will be an online formative assessment. After completion of all topics, there will be a combined summative assessment

in the form of context-rich MCQ. All trainees must attain minimum competency in the summative assessment. Alternatively, these topics can be assessed in a summative manner, along with a specialty examination.

This may include case studies, high-quality images, worked examples of prescribing drugs in disease states, and Internet resources.

Module 1: Introduction

1. Safe Drug Prescription
2. Hospital Acquired Infections
3. Sepsis, SIRS, and DIVC
4. Antibiotic Stewardship
5. Blood Transfusion

Safe Drug Prescription

At the end of the learning unit, you should be able to

a. recognize the importance of safe drug prescription in health care;
b. describe various adverse drug reactions with examples of commonly prescribed drugs that can cause such reactions;
c. apply principles of drug–drug interactions, drug–disease interactions, and drug–food interactions in common situations;
d. apply principles of drug prescription in special situations such as renal failure and liver failure;
e. apply principles of drug prescription for elderly, pediatric, and pregnant/lactating patients;
f. promote evidence-based, cost-effective prescriptions; and
g. discuss ethical and legal frameworks governing safe drug prescription in Saudi Arabia.

Hospital Acquired Infections (HAI)

At the end of the learning unit, you should be able to

a. discuss the epidemiology of HAI with special reference to HAI in Saudi Arabia;
b. recognize HAI as one of the major emerging threats in health care;

c. identify the common sources and set-ups of HAI;
d. describe the risk factors of common HAIs such as ventilator-associated pneumonia, MRSA, CLABSI, and vancomycin-resistant enterococcus (VRE);
e. identify the role of health care workers in the prevention of HAI;
f. determine appropriate pharmacological (e.g., selected antibiotic) and non-pharmacological (e.g., removal of indwelling catheter) measures in the treatment of HAI; and
g. propose a plan to prevent HAI in the workplace.

Sepsis, SIRS, and DIVC

At the end of the learning unit, you should be able to

a. explain the pathogenesis of sepsis, SIRS, and DIVC;
b. identify patient-related and non-patient-related predisposing factors of sepsis, SIRS, and DIVC;
c. recognize a patient at risk of developing sepsis, SIRS, and DIVC;
d. describe the complications of sepsis, SIRS, and DIVC;
e. apply the principles of management of patients with sepsis, SIRS, and DIVC; and
f. describe the prognosis of sepsis, SIRS, and DIVC.

Antibiotic Stewardship

At the end of the learning unit, you should be able to

a. recognize antibiotic resistance as one of the most pressing public health threats globally;
b. describe the mechanism of antibiotic resistance;
c. determine the appropriate and inappropriate use of antibiotics;
d. develop a plan for safe and proper antibiotic usage plan, including right indications, duration, antibiotic type, and discontinuation; and
e. appraise local guidelines in the prevention of antibiotic resistance.

Blood Transfusion

At the end of the learning unit, you should be able to

a. review the different components of blood products available for transfusion;

b. recognize the indications and contraindications of blood product transfusion;
c. discuss the benefits, risks, and alternatives to transfusion;
d. acquire consent for specific blood product transfusion;
e. perform steps necessary for safe transfusion;
f. develop an understanding of special precautions and procedures necessary during massive transfusions; and
g. recognize transfusion-associated reactions and provide immediate management.

Module 2: Cancer

1. Principles of Cancer Management
2. Side Effects of Chemotherapy and Radiation therapy
3. Oncological Emergencies
4. Cancer Prevention
5. Cancer Patient Surveillance and Follow-up

Principles of Cancer Management

At the end of the learning unit, you should be able to

a. discuss the basic principles of staging and grading of cancers and
a. enumerate the basic principles, (e.g., indications, mechanism, types) of cancer surgery, chemotherapy, radiotherapy, immunotherapy, and hormone therapy.

Side Effects of Chemotherapy and Radiation Therapy

At the end of the learning unit, you should be able to

a. describe important side effects (e.g., frequent life or organ threatening) of common chemotherapy drugs;
b. explain principles of monitoring side-effects in a patient undergoing chemotherapy;
c. describe measures (pharmacological and non-pharmacological) available to ameliorate the side effects of commonly prescribed chemotherapy drugs;
d. describe important (e.g., common and life-threatening) side effects of radiation therapy; and

e. describe measures (pharmacological and non-pharmacological) available to ameliorate the side-effects of radiotherapy.

Oncological Emergencies

At the end of the learning unit, you should be able to

a. enumerate important oncologic emergencies encountered in hospital and ambulatory settings;
b. discuss the pathogenesis of important oncologic emergencies;
c. recognize oncological emergencies;
d. institute immediate measures when treating a patient with oncologic emergencies; and
e. counsel patients in an anticipatory manner to recognize and prevent oncological emergencies.

Cancer Prevention

At the end of the learning unit, you should be able to

a. conclude that many major cancers are preventable;
b. identify smoking prevention and lifestyle modifications that are major preventable measures;
c. recognize cancers that are preventable;
d. discuss the major cancer prevention strategies at the individual and national levels; and
e. counsel patients and families in a proactive manner regarding cancer prevention and screening.

Cancer Patient Surveillance and Follow-Up

At the end of the learning unit, you should be able to

a. describe the principles of surveillance and follow-up of cancer patients;
b. enumerate the surveillance measures and follow-up plans for common forms of cancer;
c. describe the role of primary care physicians, family physicians, and others in the cancer patient surveillance and follow-up; and
d. liaise with oncologists to provide surveillance and follow-up for cancer patients.

Module 3: Diabetes and Metabolic Disorders

1. Recognition and Management of Diabetic Emergencies
2. Management of Diabetic Complications
3. Comorbidities of Obesity
4. Abnormal ECGs

Recognition and Management of Diabetic Emergencies

At the end of the learning unit, you should be able to

a. describe the pathogenesis of common diabetic emergencies and their complications;
b. identify risk factors and groups of patients vulnerable to such emergencies;
c. recognize a patient presenting with a diabetic emergency;
d. institute immediate management;
e. refer the patient to the appropriate next level of care; and
f. counsel patients and families to prevent such emergencies.

Management of Diabetic Complications

At the end of the learning unit, you should be able to

a. describe the pathogenesis of important complications of type 2 diabetes mellitus;
b. screen patients for such complications;
c. take preventive measures for such complications;
d. treat such complications; and
e. counsel patients and families with special emphasis on prevention.

Comorbidities of Obesity

At the end of the learning unit, you should be able to

a. screen patients for the presence of common and important comorbidities of obesity;
b. manage obesity-related comorbidities; and
c. provide dietary and lifestyle advice for the prevention and management of obesity.

Abnormal ECGs

At the end of the learning unit, you should be able to

a. recognize common and important ECG abnormalities and
b. institute immediate management, if necessary.

Module 4: Medical and Surgical Emergencies

1. Management of Acute Chest Pain
2. Management of Acute Breathlessness
3. Management of Altered Sensorium
4. Management of Hypotension and Hypertension
5. Management of Upper GI Bleeding
6. Management of Lower GI Bleeding

At the end of the learning unit, you should be able to

a. triage and categorize patients;
b. identify patients who need prompt medical and surgical attention;
c. generate preliminary diagnoses-based history and physical examination;
d. order and interpret urgent investigations;
e. provide appropriate immediate management to patients; and
f. refer the patients to next level of care, if needed.

Module 5: Acute Care

1. Pre-operative assessment
2. Post-operative care
3. Acute pain management
4. Chronic pain management
5. Management of fluid in the hospitalized patient
6. Management of electrolyte imbalances

Pre-Operative Assessment

At the end of the learning unit, you should be able to

a. describe the basic principles of pre-operative assessment;

b. perform pre-operative assessment in uncomplicated patients with special emphasis on
    i) general health assessment
    ii) cardiorespiratory assessment
    iii) medications and medical device assessment
    iv) drug allergies
    v) pain relief needs; and
c. categorize patients according to risks.

Post-Operative Care

At the end of the learning unit, you should be able to

a. devise a post-operative care plan, including monitoring of vitals, pain management, fluid management, medications, and laboratory investigations;
b. hand over the patients properly to appropriate facilities;
c. describe the process of post-operative recovery in a patient;
d. identify common post-operative complications;
e. monitor patients for possible post-operative complications; and
f. institute immediate management for post-operative complications.

Acute Pain Management

At the end of the learning unit, you should be able to

a. review the physiological basis of pain perception;
b. proactively identify patients who might be in acute pain;
c. assess a patient with acute pain;
d. apply various pharmacological and non-pharmacological modalities available for acute pain management;
e. provide adequate pain relief for uncomplicated patients with acute pain; and
f. identify and refer patients with acute pain who can benefit from specialized pain services

Chronic Pain Management

At the end of the learning unit, you should be able to

a. review the bio-psychosocial and physiological basis of chronic pain perception;
b. discuss various pharmacological and non-pharmacological options available for chronic pain management;
c. provide adequate pain relief for uncomplicated patients with chronic pain; and
d. identify and refer patients with chronic pain who can benefit from specialized pain services.

Management of Fluid in Hospitalized Patients

At the end of the learning unit, you should be able to

a. review the physiological basis of water balance in the body;
b. assess a patient for his/her hydration status;
c. recognize an overhydrated and dehydrated patient;
d. order fluid therapy (oral and/or intravenous) for a hospitalized patient; and
e. monitor fluid status and response to therapy through history, physical examination, and selected laboratory investigations.

Management of Acid-Base Electrolyte Imbalances

At the end of the learning unit, you should be able to

a. review the physiological basis of electrolyte and acid-base balance in the body;
b. identify diseases and conditions that are likely to cause or be associated with acid/base and electrolyte imbalances;
c. correct electrolyte and acid-base imbalances;
d. perform careful calculations, checks, and other safety measures while correcting the acid-base and electrolyte imbalances; and
e. monitor response to therapy through history, physical examination, and selected laboratory investigations.

Module 6: Frail Elderly

1. Assessment of frail elderly
2. Mini-mental state examination
3. Prescribing drugs for the elderly
4. Care of the elderly

Assessment of Frail Elderly

At the of the learning unit, you should be able to

a. enumerate the differences and similarities between comprehensive assessment of an elderly individual and assessment of other patients;
b. perform comprehensive assessment, in conjunction with other members of the health care team, of a frail, elderly individual with special emphasis on social factors, functional status, quality of life, diet and nutrition, and medication history; and
c. develop a problem list based on the assessment of the frail elderly individual.

Mini-Mental State Examination (MSE)

At the end of the learning unit, you should be able to

a. review the appropriate usages, advantages, and potential pitfalls of mini-MSE;
b. identify patients suitable for mini-MSE; and
c. screen patients for cognitive impairment through mini-MSE.

Prescribing Drugs for the Elderly

At the end of the learning unit, you should be able to

a. discuss the principles of prescribing for the elderly;
b. recognize polypharmacy, prescribing cascade, inappropriate dosages, inappropriate drugs, and deliberate drug exclusion as major causes of morbidity among the elderly;
c. describe physiological and functional declines in the elderly that contribute to increased drug-related, adverse events;
d. discuss drug–drug interactions and drug–disease interactions among the elderly;

e. be familiar with Beers criteria;
f. develop rational prescription habits for the elderly; and
g. counsel elderly patients and family on safe medication usage.

Care of the Elderly

At the end of the learning unit, you should be able to

a. describe the factors that need to be considered while planning care for the elderly;
b. recognize the needs and well-being of caregivers;
c. identify the local and community resources available for care of the elderly; and
d. develop, with input from other health care professionals, individualized care plans for elderly patients.

Module 7: Ethics and Healthcare

1. Occupational hazards of HCW
2. Evidence-based approach to smoking cessation
3. Patient advocacy
4. Ethical issues: Transplantation/organ harvesting; withdrawal of care
5. Ethical issues: Treatment refusal; patient autonomy
6. Role of doctors in death and dying

Occupation Hazards of Health Care Workers (HCW)

At the end of the learning unit, you should be able to

a. recognize common sources and risk factors of occupational hazards among HCWs;
b. describe common occupational hazards in the workplace;
c. develop familiarity with legal and regulatory frameworks governing occupational hazards among HCWs;
d. develop a proactive attitude to promote workplace safety; and
e. protect yourself and colleagues against potential occupational hazards in the workplace.

Evidence-Based Approach to Smoking Cessation

At the end of the learning unit, you should be able to

a. describe the epidemiology of smoking and tobacco use in Saudi Arabia;
b. review the effects of smoking on smokers and family members;
c. effectively use pharmacologic and non-pharmacologic measures to treat tobacco use and dependence; and
d. effectively use pharmacologic and non-pharmacologic measures to treat tobacco use and dependence among special population groups, such as pregnant women, adolescents, and patients with psychiatric disorders.

Patient Advocacy

At the end of the learning unit, you should be able to
a. define patient advocacy;
b. recognize patient advocacy as a core value governing medical practice;
c. describe the role of patient advocates in patient care;
d. develop a positive attitude toward patient advocacy;
e. be a patient advocate in conflicting situations; and
f. be familiar with local and national patient advocacy groups.

Ethical issues: Transplantation/organ harvesting; withdrawal of care

At the end of the learning unit, you should be able to:
a. apply key ethical and religious principles governing organ transplantation and withdrawal of care;
b. be familiar with the legal and regulatory guidelines regarding organ transplantation and withdrawal of care;
c. counsel patients and families in light of applicable ethical and religious principles; and
d. guide patients and families to make informed decisions.

Ethical issues: Treatment refusal; patient autonomy

At the end of the learning unit, you should be able to
a. predict situations where a patient or family is likely to decline prescribed treatment;

b. describe the concept of “rational adults” in the context of patient autonomy and treatment refusal;
c. analyze key ethical, moral, and regulatory dilemmas in treatment refusal;
d. recognize the importance of patient autonomy in the decision-making process; and
e. counsel patients and families declining medical treatment in light of the patient’s best interest.

Role of Doctors in Death and Dying

At the end of the learning unit, you should be able to

a. recognize the important role a doctor can play during the process of dying;
b. provide emotional as well as physical care to a dying patient and his/her family;
c. provide appropriate pain management to a dying patient; and
d. identify suitable patients to refer to palliative care services.

Appendix-D

Top Conditions and Procedures in Specialties

Top 10 Causes of Mortality in Saudi Arabia*			
Disease; Conditions		Relative Frequency	Cumulative Frequency
1.	Condition A	18%	18%
2.	Condition B	13%	31%
3.	Condition C	10%	41%
*In some specialties it is the overall mortality pattern that is important. However, for others, it might be diseases that are important. The numbers shown here are fictional.			
Top 10 Cancers			
Disease; Conditions		Relative Frequency	Cumulative Frequency
1.	Lung	18%	18%
2.	Colorectal	13%	31%
3.	Prostrate	10%	41%
Top 10 Causes of Out-Patient Consultations Related to Specialty in Saudi Arabia			
Disease; Conditions		Relative Frequency	Cumulative Frequency
1.	Condition A	22%	22%
2.	Condition B	12%	34%
3.	Condition C	10%	44%
Top 10 Causes of In-Patient Admissions Related to Specialty in Saudi Arabia			
Disease; Conditions		Relative Frequency	Cumulative Frequency
1.	Condition A	18%	18%
2.	Condition B	13%	31%
3.	Condition C	10%	41%

Top 10 Procedures/Surgeries Performed by Specialty	
Name of Procedures/Surgeries	Approximate Frequency
Procedure A	
Procedure B	
Procedure C	

Examples of Core Specialty Topics: Case Discussions; Interactive Lectures	
Topics	Comments
Approach to patients with urinary retention	
Approach to patients with hematuria	

Examples of Core Specialty Topics: Workshops/Simulations	
Topics	Comments
ECG interpretation and response	
Chest tube insertion and removal	
Wound care	
Surgical drains	

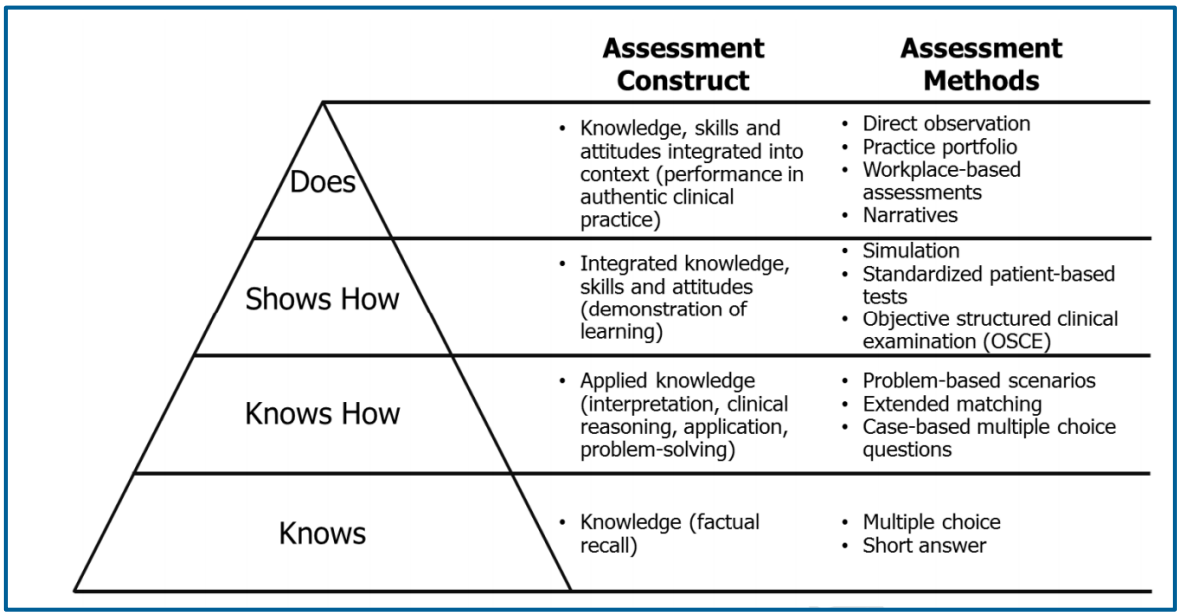
Appendix-E

The following is a table with example topics that illustrate the half day activities spanning the course of 1 year (or cycle of teaching if more than 1 year is required to cover all topics).

Academic Week	Section	Date	Time	Sessions	Presenters
1	Surgical Pathology	Oct-5	13:00–14:00	Welcoming new students	Program director
			14:00–15:00	Prostatic carcinoma and its mimickers	A
			15:00–16:00	Mixed head and neck cases	B
2	Lymph node	Oct-12	13:00–14:00	Normal histology and biology	C
			14:00–15:00	Classification of hematolymphoid neoplasm	D
			15:00–16:00	Pattern-based approach	E
3	CNS	Ot- 19	13:00–14:00	Intraoperative consultation	F
			14:00–15:00	Approach to brain tumors	B
			15:00–16:00	Glioneuronal tumors	C
4	Bone and soft tissue	Oct- 26	13:00–14:00	Bone tumor (practical cases)	K
			14:00–15:00	Approach to fibro-osseous lesions	B
			15:00–16:00	Selected cases in soft tissue tumors	A

Appendix-F

Miller's Pyramid of Assessment provides a framework for assessing the trainees' clinical competences. It acts a roadmap for trainers to select the appropriate assessment methods to target different clinical competencies including "knows," "knows how," "shows how," and "does" (2).



(Figure 1: Miller Pyramid)

1- Adapted from Walsh CM In-training gastrointestinal endoscopy competency assessment tools: Types of tools, validation, and impact. Best Practice and Research Clinical Gastroenterology 2016 Jun 1;30(3):357–74.

2- Miller GE. Assessment of clinical skills/competence/performance Acad Med. 1990;65(9 Suppl): S63–7.

Appendix-G

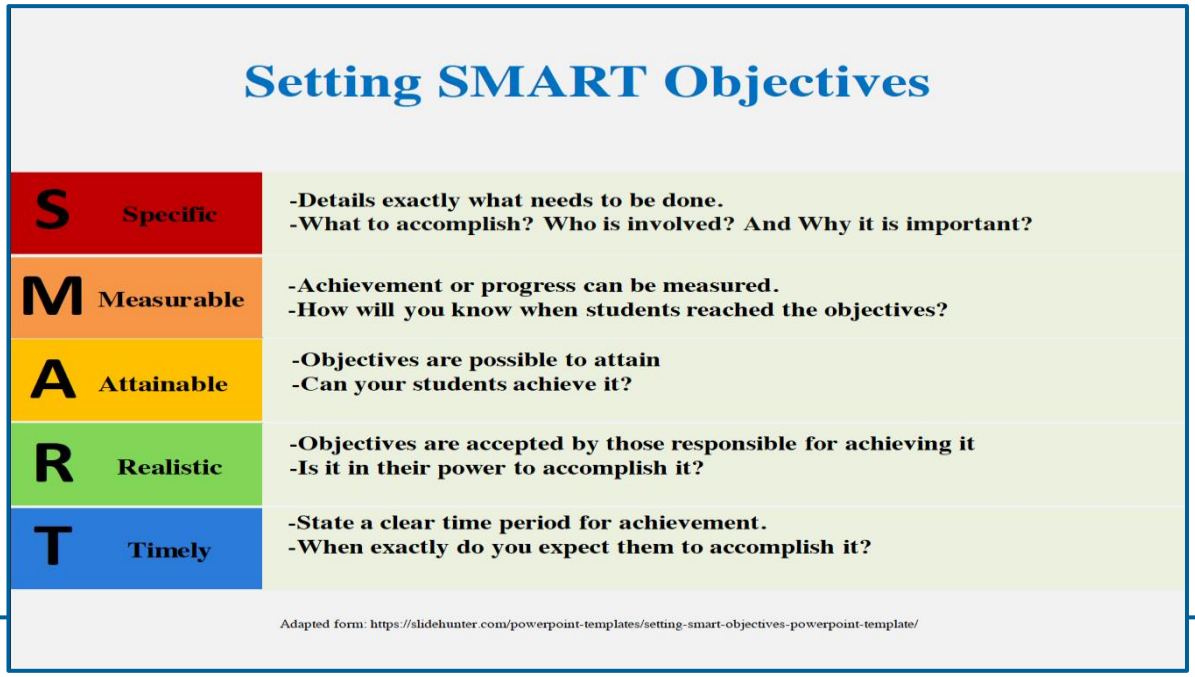
Glossary

Glossary	
Blueprint	A description correlating educational objectives with assessment contents. For example, the test blueprint defines the proportion of test questions allocated to each learning domain and/or content.
Competency	Capability to function within a defined professional role that implies entrustment of a trainee by graduation of the program with the required knowledge, skills, and attitude needed to practice unsupervised.
Specialty Core Content (skills, knowledge, and professional attitude)	Knowledge, skill, or professional attitude that is specific and integral to the given specialty.
Formative assessment	An assessment used to inform the trainer and learner of what has been taught and learned, respectively, for the purpose of improving learning. Typically, the results of formative assessment are communicated through feedback to the learner. Formative assessments are not primarily intended to make judgments or decisions (although this can be a secondary gain).
Mastery	Exceeding the minimum level of competency to the proficient level of performance indicating rich experience with possession of great knowledge, skills, and attitude.
Summative Assessment	An assessment that describes the composite performance of learner development at a particular point in time and is used to inform judgments and make decisions about the level of learning and certification.
Universal Topic	Knowledge, skills, or professional behavior that is not specific to the given specialty but is universal for the general practice of a given health care profession.

Appendix-H

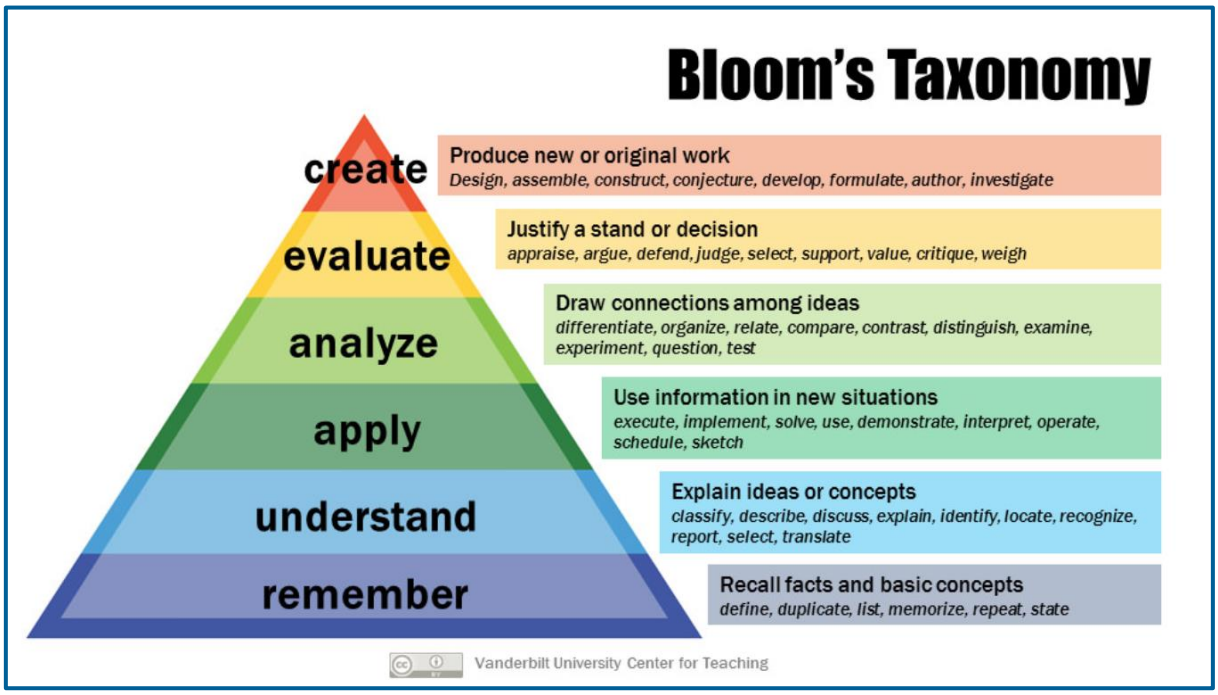
How to Write Objectives in SMART style

A. SMART objectives

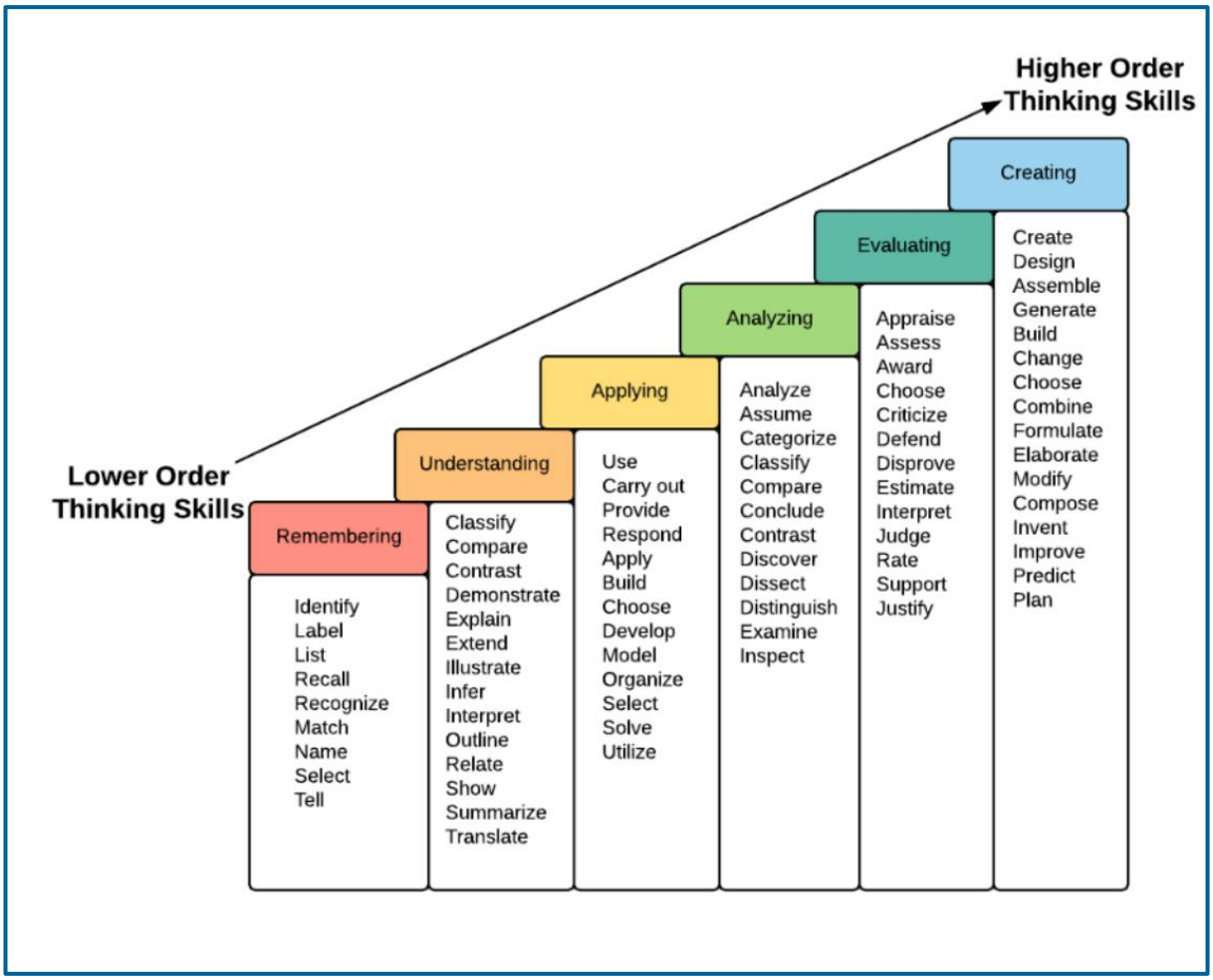


B. Bloom's Taxonomy of Action Verbs

Level	Definition	Sample verbs					Sample behaviors
KNOWLEDGE	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	arrange define describe duplicate	identify label list match	memorize name order outline	recognize relate recall repeat	reproduce select state	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
COMPREHENSION	Student translates, comprehends, or interprets information based on prior learning.	explain summarize paraphrase describe illustrate classify	convert defend describe discuss distinguish	estimate explain express extend generalized give example(s)	identify indicate infer locate paraphrase predict	recognize rewrite review select summarize translate	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
APPLICATION	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	use compute solve demonstrate apply construct	apply change choose compute demonstrate discover dramatize	employ illustrate interpret manipulate modify operate	practice predict prepare produce relate schedule	show sketch solve use write	The student will write an instructional objective for each level of Bloom's taxonomy.
ANALYSIS	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement	analyze categorize compare contrast separate apply	change discover choose compute demonstrate dramatize	employ illustrate interpret manipulate modify operate	practice predict prepare produce relate schedule	show sketch solve use write	The student will compare and contrast the cognitive and affective domains.
SYNTHESIS	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	create design hypothesize invent develop arrange assemble	categorize collect combine comply compose construct create	design develop devise explain formulate generate plan	prepare rearrange reconstruct relate reorganize revise	rewrite set up summarize synthesize tell write	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.
EVALUATION	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify Appraise Argue	Assess Attach Choose Compare Conclude Contrast	Defend Describe Discriminate Estimate Evaluate	Explain Judge Justify Interpret Relate	Predict Rate Select Summarize Support Value	The student will judge the effective-ness of writing objectives using Bloom's taxonomy.



Examples of verbs to use in writing objectives



Appendix-I

2.2.6 RESEARCH ROTATION

Number of rotation months	First year	Second year	Total
	0	1	1

MEDICAL EXPERT

Goals:

- Demonstrate an understanding of the basic principles of research design, methodology, data analysis, and clinical epidemiology. In addition, know the advantages and disadvantages from the perspective of radiology.
- Familiarize themselves with the ethical requirements of research and demonstrate an understanding of the responsible use of informed consent.
- Understand and practice appropriate methods for writing the research manuscript, data collection, and analysis and discussion of results.
- Demonstrate an awareness of the current research topics in radiology using available medical informatics systems.
- Acquire the requisite skills for scientific presentations and public discussions.

Training Methods

- A dedicated 1-month, full-time rotation in research is conducted.
- It is expected that the project will span more than 1 month. Therefore, the completion of the work should be parallel to the other subsequent rotations.
- The fellow must choose a supervisor to help access the essential resources that will allow for an appropriate understanding of research skills and periodic discussion of progress.
- Attendance at dedicated courses or workshops that enhance research skills may be required by the program.
- The fellow must finish the research proposal by the end of the first 6 months, and it should be accepted by the Neuroradiology Research

Committee.

- The oral abstract of the study results should be presented in the second year on the Fellows Neuroradiology Research Day.
- The research paper should be sent at least 2 weeks prior to the Neuroradiology Research Day.
- It is highly desirable for fellows to work on presenting the research results at national and/or international meetings and work hard to publish their work in indexed journals.

Evaluation

- Attendance at designated courses/lectures is monitored and incorporated into the annual evaluation score.
- Panel scoring of the research abstract presentation will be conducted at the end of the second year on Neuroradiology Research Day. This is counted as the rotation score for that month (see Appendix 9).

COMMUNICATOR

- Demonstrate skills in conveying and discussing scientific research to scientific communities through posters, abstracts, teaching slides, manuscripts, or other media.
- Communicate and collaborate effectively with the research supervisor to conduct the research.

COLLABORATOR

- Identify, consult, and collaborate with appropriate experts to conduct the research.

LEADER

- Demonstrate the ability to identify an area of research interest and a research supervisor in order to engage in the scholarship of scientific inquiry and dissemination.
- Demonstrate the ability to utilize available resources and regularly meet with an identified research mentor.
- Demonstrate the ability to set realistic priorities and use time effectively to optimize professional performance.
- Demonstrate an understanding of the cost-effective use of health care resources.

HEALTH ADVOCATE

- Recognize the contributions of scientific research in improving the health of patients and communities.

SCHOLAR

- Demonstrate the ability to pose an appropriate research question, recognize and identify gaps in knowledge and expertise around this question, and formulate an appropriate study design to answer it.
- Demonstrate the ability to carry out the research outlined in the proposal.
- Demonstrate the ability to conduct data collection, data analysis, and preparation of an abstract and manuscript.
- Demonstrate the ability to identify areas for further research.

PROFESSIONAL

- Ensure ethical and professional research expectations are consistent with institutional review board guidelines, including the maintenance of meticulous data and proper conduct consistent with ethical research.
- Demonstrate personal responsibility for setting research goals and working with supervisors to set and achieve research timeline objectives.
- Publish accurate and reliable research results with attention to appropriate authorship attribution criteria.
- Disclose potential financial conflicts of interest (including speaker fees and consultative relationships) as appropriate when engaging in and disseminating research results.

Appendix-J

References:

Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.

Study materials include, but are not limited to (please refer to the most recent edition):

Sample Textbooks and Online resources

“Manual of Surgical Pathology” by Lester, latest edition

"Sternberg's Diagnostic Surgical Pathology" by Stacey E. Mills, latest edition

"Robbins and Cotran Pathologic Basis of Disease" by Vinay Kumar, Abul K. Abbas, and Jon C. Aster, latest edition

"Rosai and Ackerman's Surgical Pathology" by Juan Rosai, latest edition

"Histology for Pathologists" by Stacey E. Mills, latest edition

“The Washington Manual of Surgical Pathology” by John D. Pfeifer, latest edition

“AFIP Atlases of Tumor and Non-Tumor Pathology”, latest edition

“Quick Reference Handbook for Surgical Pathologists” by Natasha Rekhtman, latest edition

“Gross Pathology Handbook: A Guide to Descriptive Terms” by Christopher Horn

WHO Classification of Tumours series, latest edition

The College of American Pathologist (CAP) Cancer Protocols

"Cytopathology" by Edmund S. Cibas and Barbara S. Ducatman, latest edition

"The Bethesda System for Reporting Thyroid Cytopathology" by Syed Z. Ali and Edmund S. Cibas, latest edition

"Atlas of Fine Needle Aspiration Cytology" by Andrew S. Field and Matthew A. Zarka, latest edition

"Autopsy Pathology: A Manual and Atlas" by Andrew J Connolly & Walter E. Finkbeiner, latest edition

"Quality Management in Anatomic Pathology: Strategies for Assessment, Improvement, and Assurance" by Qihui "Jim" Zhai, latest edition

"Professionalism and Ethics, Handbook for Residents, Practical guide", Prof. James Ware, SCFHS, Latest Edition.

"Essentials of Patient Safety", SCFHS, Latest Edition

Sample Journals

* Journal of Clinical Pathology
* American Journal of Surgical Pathology
* Histopathology
* Archives of Pathology and Laboratory Medicine